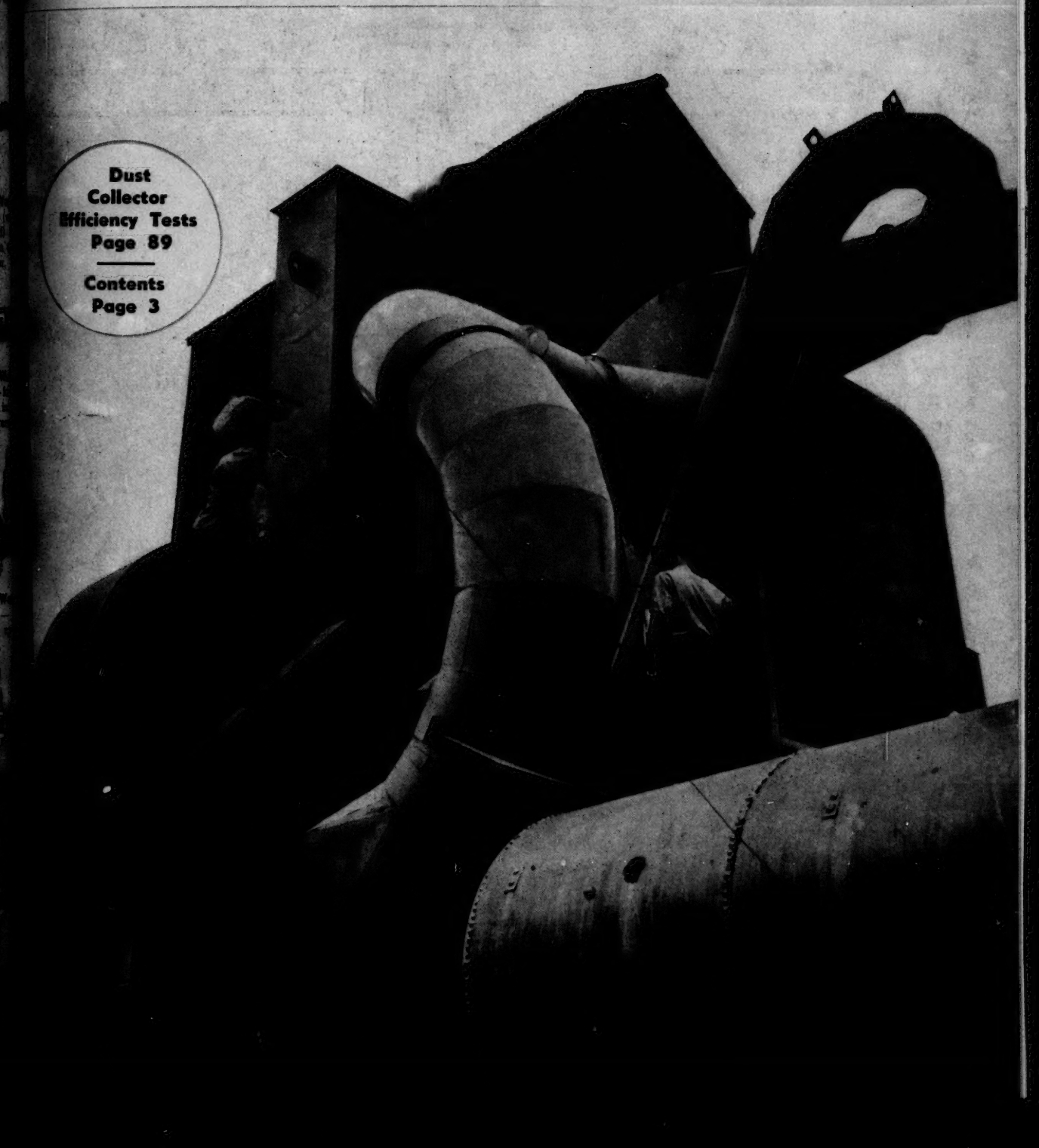
APRIL, 1954

HEATING AND VENTILATING

INCLUDING AIR CONDITIONING – PIPING – REFRIGERATION – AIR SANITATION



Dust Collector Efficiency Tests
Page 89

Contents
Page 3

VACUUM ISN'T VACUUM

TO A STEAM TRAP

. . . It's Just Pressure Below Atmospheric

ONLY 2½¢ per year per *trap* parts costs on traps averaging 11 years of service at Globe Steel Tubes Company, Milwaukee, Wisconsin.

***PRACTICALLY ZERO maintenance*, complete satisfaction with traps after 12 years service on 10 lbs. pressure, 5" vacuum—Liquid Veneer Corp., Buffalo, N.Y.**

***Send for 4-page Bulletin No. 223, "Vacuum Isn't Vacuum"—a complete discussion of vacuum, effect on trap selection, causes of vacuum loss, effect of flash steam, etc. Free on request. Just fill in and mail the coupon.**

BUYERS are sometimes told that steam traps for vacuum return service must be "different"—requiring, we suppose, some mysterious ability to recognize vacuum and act accordingly.

The truth is that vacuum isn't vacuum to any steam trap. It is just pressure below atmospheric pressure. All vacuum does is increase the pressure differential across the trap orifice. An Armstrong trap doesn't care whether it discharges to vacuum, back pressure or atmosphere. It works just the same in all cases.

Because Armstrong traps don't have to wait for condensate to cool, drainage is fast and equipment temperatures and BTU output are maximum.

Armstrong traps won't cause you to lose vacuum. Any flash steam from their discharge is quickly condensed. *It is the leaky traps that make it hard to hold vacuum!*

The mechanisms in Armstrong traps for low pressure vacuum return service are identical in design, workmanship and materials to those used in traps for 900°F, 950 lbs. pressure. They can't help but operate a long, long time without leaking. This makes it nice for the maintenance man, too.

Fast heat-up, high temperatures, low maintenance, long life—all wrapped up in one package. Ask your Armstrong Representative to go over your vacuum heating system with you.

ARMSTRONG MACHINE WORKS
846 Maple St., Three Rivers, Michigan

ARMSTRONG MACHINE WORKS
846 Maple St., Three Rivers, Michigan
Please send Bulletin 223, "Vacuum Isn't Vacuum"

Name _____

Company _____

Street Address _____

City _____ **Zone** ____ **State** _____

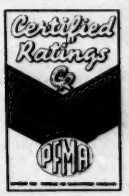
TRUST A TESTING LAB TO BUY ON

CE

A laboratory that tests ventilating equipment is in a good position to select efficient ventilators for its *own* buildings. Texas Agricultural and Mechanical College is the authorized neutral laboratory certifying fan capacities for the Power Fan Manufacturers Association. Familiar with all types of fan equipment, this college chose DeBothezat Power-Flow Roof Ventilators for its new Veterinary Hospital.

GET ALL THE AIR YOU PAY FOR

Capacity ratings of DeBothezat Power-Flow Roof Ventilators are the output of the completely assembled unit, *including the head.* These ratings are obtained from wind tunnel tests conducted in accordance with NAFM Standard Test Code Bulletin number 110, Plate VIA. They conform to U. S. Department of Commerce Standard 178-51, which embodies the test codes of ASHVE, NAFM and PFMA.



Next time you buy or specify roof ventilators, consider their cost in terms of CFM. And for your own protection, ask the manufacturer how he arrives at ventilator capacity ratings.

DeBothezat Power-Flow Roof Ventilators atop the Veterinary Hospital at Texas A&M College. Hospital built under the direction of Arch C. Baker, Texas A&M College System Architect, and J. W. Hall, Consulting Engineer.

SEND FOR FREE CATALOG

DeBothezat Fans

DeBothezat Fans Division
American Machine and Metals, Inc.
Dept. HV-454, East Moline, Illinois

Send Catalog DR-3-53 containing certified ratings and complete data on Power-Flow Roof Ventilators.

FIRM NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

NAME AND TITLE _____

Classroom in Wakelon Public School, Zebulon, N. C. Architects: Page & Smith, Raleigh, N. C. Heating Contractor: Bullock & Proctor, Raleigh, N. C.

Schools by Page & Smith Use Webster Tru-Perimeter Heating

Wakelon Public School is typical of the modern, low cost schools in North Carolina designed by Page & Smith, Raleigh, and using Webster Steam Heating Equipment.

Examine this pleasing interior. Note the wall-to-wall installation of Webster Walvector blanketing the entire window area and concealing all piping. Tru-Perimeter Heating with Webster Walvector spreads gentle, even heat along cold perimeter walls — offsets heat loss beneath windows — provides draft-free comfort with window ventilation.

Wakelon School has 12,914 sq. ft. of floor space, 6 rooms and cafeteria, built in 1952 at a total cost of $127,000. Heating contract was $11,585 or 9 per cent of the total construction cost.

Webster Tru-Perimeter Heating for Schools uses Webster Walvector to replace the heat at the perimeter where heat loss occurs. Heating elements mounted close to the floor spread heat the entire length of exposed walls, warm the air in the room, the floors, and the inside surface of outside walls. Gently moving warmed air is drawn to floor level and across the floor into the inlet opening of the radiation.

Webster Tru-Perimeter Heating results can be obtained with either forced hot water or Webster Moderator controlled low-pressure steam heating which varies heating automatically with outdoor temperature. Steam circulation is facilitated with Webster Traps and Valves. The rugged single unit Webster Moderator Control involves minimum maintenance cost — no blowers or fans, no buried piping, no useful floor space taken.

Look into Webster Tru-Perimeter Heating for *your* school. Call the Webster representative or write us.

Address Dept. HV-4

WARREN WEBSTER & COMPANY

Camden 5, N. J., Representatives in Principal U. S. Cities

In Canada, Darling Brothers, Limited, Montreal

Webster WALVECTOR

REG. U. S. PAT. OFF.

For Steam or Hot Water Heating

HEATING AND VENTILATING

A MONTHLY MAGAZINE FOR ENGINEERS AND CONTRACTORS CONCERNED WITH THE DESIGN AND APPLICATION OF AIR CONDITIONING, REFRIGERATION, PIPING, PLUMBING, AIR SANITATION, HEATING AND VENTILATION IN BUILDINGS

April, 1954
VOLUME 51—NO. 4

The Cover: Simultaneous sampling at inlet and outlet ducts of dust collector at a Michigan asphalt plant. Tests made by Michigan Health Department. See page 89. Credit for the March cover photo should have been to Westinghouse Electric Corp.

CONTENTS

Motors for Refrigerating Plants—D. H. Ruark 83
Industrial Air Conditioning is a Necessity 88
Efficiency Studies of Three Dust Collectors—B. D. Bloomfield 89
Solar Heat Collectors Used with Heat Pumps 96
Refrigerating Code Protects Apartment Dwellers 98
World's Largest Belt Conveyor 109
Court Decisions of Interest to Heating Contractors—L. T. Parker 110
Packaged Air Conditioning Units Serve New TV Station 115

REFERENCE MATERIAL

Section—Air Conditioning the Beauty Shop—J. T. Dabbs 99
Detail Sheet—Sump Pump Installation 107
Data Sheet—Solar Energy Received on a Horizontal Surface ....Opposite 164

DEPARTMENTS

Washington News—L. J. Overman 4
Briefly Stated 8
Picture Paragraphs 94
What Would You Do? 114
London Letter 116
Experience is my Classroom—T. W. Reynolds 118
News of Equipment and Materials 119
New Catalogs .....Opposite 132
Product Applications 134
News of the Month 138
Ad-Digest .....Opposite 148
What Readers Say 154
Canadian Degree-Days for February, 1954 154
Degree-Days for February, 1954 156
Coming Events 158
Index to Advertisers 163

The contents of Heating and Ventilating are indexed monthly by Industrial Arts Index and by Engineering Index, and are microfilmed by University Microfilms, Ann Arbor, Michigan.

Editorial Staff

Editor
CLIFFORD STROCK

Associate Editors
NATHAN N. WOLPERT
WILLIAM B. FOXHALL

Publisher

THE INDUSTRIAL PRESS
Editorial and Circulation offices at
148 Lafayette St.,
New York 13, N. Y.

President
ROBERT B. LUCHARS

Vice-President and Treasurer
EDGAR A. BECKER

Secretary and Publishing Manager
HAROLD L. GRAY

Subscription Rates

HEATING AND VENTILATING, published monthly by The Industrial Press, 116 Main St., Norwalk, Conn. Executive offices 148 Lafayette St., New York 13, N. Y. Entered as second-class matter, February 16, 1954, at the Post Office, Norwalk, Conn., under act of March 3, 1879.

Subscription rates in the United States and Canada, one year, $3; two years, $5; three years, $6; in all other countries, one year, $7; two years, $11. Single copies 30 cents.

Copyright, 1954, by The Industrial Press, New York, N. Y. Permission required to reproduce articles in whole or in part.

Representatives

CHICAGO 1
George G. Turner
228 North La Salle Street.

NEW YORK 13
Harry J. Twine, Thomas A. Earing
148 Lafayette Street.

CLEVELAND 12
Edward B. McEntee
17115 Hillsboro Road.

LOS ANGELES 5
Robert H. Deibler
2506 W. 8th Street.

MEMBER: Audit Bureau of Circulations—National Business Publications—Society of Business Magazine Editors

Washington News

LORING F. OVERMAN

DEEP in March, with Washington still hoping that Spring would put an end to recession jitters, it began to appear that in any event, the heating and ventilating industries had little cause for concern. There were several reasons:

Construction accomplishments and outlook were still favorable.

New encouragement was being given to "protective" construction projects.

Smog control was being advocated.

Fuel policies of the Petroleum Administration for Defense forecast busy days ahead.

The Small Business Administration was urging that its clients be given a greater share of the declining defense budget.

Construction-Surprise

Construction continued to be a bright spot in the industrial picture. Spending amounted to $2.317 million for February, 1% higher than for February of 1953—previous record month. The 1954 total was 5% under January of this year—but the January-February seasonal drop is usually figured at 20 to 30%. Construction expenditures for the first two months of this year total $4.745 million—2% higher than during the first two months of last year.

Department of Commerce spokesmen estimate that spending through March and April will be ahead of the first four months of 1953, but that construction will then level off. Total for 1954 is still estimated at around $34.1 billion—about 2% below last year. Private construction accounted for the current gains. Residential was down 7% from January, but non-residential construction of all types was up 10%. Biggest gain was in a category where heating and ventilating plays an important part—social and recreational construction. Total there was 60% higher than the same period of 1953.

Protective Construction Encouraged

Of particular interest since air-conditioning and allied services are usually involved, is a new Defense Mobilization Order VI-4. It outlines procedures under which rapid tax amortization may be obtained for "protective construction". The Office of Defense Mobilization defines protective construction as "that extraordinary construction, above and below ground, dseigned to resist weapons effects, including structural strengthening of building, installation of damage-resistant materials, compartmentation, special shelters for personnel and equipment, and equipment for plant services and utility systems".

The new ODM order specifies conditions under which applications for amortization will be approved. Application forms may be obtained from Department of Commerce and Small Business Administration field offices. The order may be of double interest to readers of HEATING AND VENTILATING. Some may themselves wish to take advantage of this special plan to "go underground". Others may find in the application lists rich sources of new business for underground or undercover installations.

Smog Control Planned

Of interest to the air sanitation groups was an amendment which Senator Capehart (R-Ind.) planned to introduce in mid-March to the Administration Housing Bill (S2938). The amendment would provide federal aid for community industrial smog control, in conjunction with new slum clearance and urban renewal programs.

Senator Capehart's plans for a smog amendment came out during a hearing before the Senate Banking Committee. Albert M. Cole, Housing and Home Finance Administrator, told the committee that a community, in order to qualify for federal slum clearance aid under the revised program, would be required to:

(1) Provide for prevention of the spread of blight into good areas in the community, through adequate enforcement of housing standards and occupancy controls and other appropriate local codes and regulations; (2) rehabilitate areas in the community which can still be saved, converting them into sound, healthy neighborhoods with parks, playgrounds, reorganized streets and traffic, and facilitating renewal of sound structure; and (3) demolish and redevelop areas which are beyond control.

Senator Capehart observed that there should be a fourth item—providing federal aid for the elimination of industrial smoke and smog. He commented that they are important factors in the creation of blighted areas and slums.

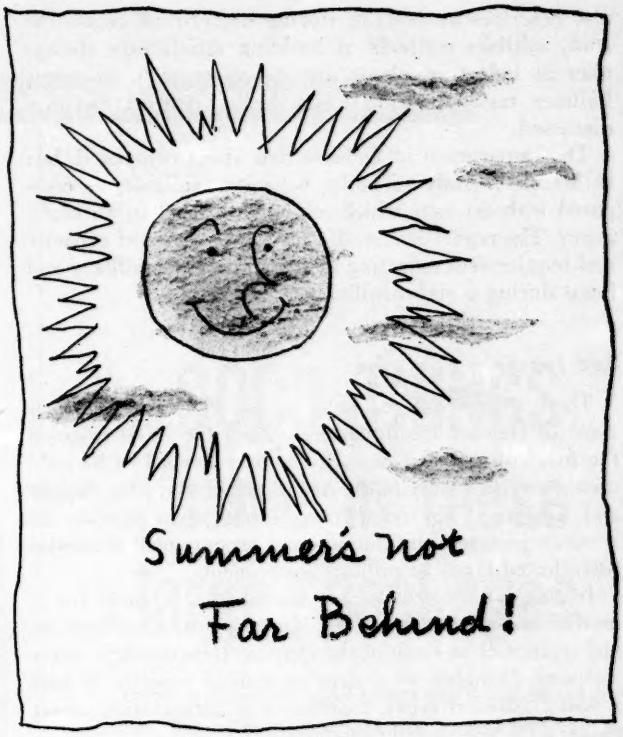
Petroleum Storage Capacity Surveyed

The Petroleum Administration for Defense—soon to go out of business under present plans—has asked the National Petroleum Council to bring up to date its reports on storage facilities for crude oil and petroleum products. PAD also wants to know about the petroleum industry's use of radar and radio. In a report last May, the industry had indicated some use of radio in geophysics, drilling and production operations, maritime and aviation service, for radiolocation work in offshore drilling operations, and in refinery and marketing operations.

Another move of interest in the fuel field is the Senate's passage of a bill (HR5976) exempting from Federal Power Commission authority the natural gas transmission activities of gas companies operating wholly within a single state. The House had previously passed the bill, which now awaits the President's signature.

Coal Studied—Boilers Surveyed

A new Bureau of Mines Report of Investigation 5034, "Storage of Low Rank Coals", may be obtained from the Bureau of Mines, Publications Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pa. The report describes methods of storing low-rank coals in the open for long periods without spontaneous combustion or significant loss of heating value. Although devoted primarily to the storage of subbituminous and lignite coals, the report



Insulation for winter warmth and fuel conservation can be more efficient and also provide coolness and comfort in summer. It can reduce original and operating costs of air-cooling equipment as well as heating plants. A building really shielded from the summer sun's radiation is considerably cooler, not only by day, but also at night. Protected against winter heat loss and Fuel waste, it warms up faster when there is no great mass of insulating material which also requires heating.

Choosing insulation should be a scientific selection based on physical needs, financial considerations...and performance. Readily available tables show the heat ray absorptivities, reflectivities, and emissivities of the different materials; their permanency, permeability to water vapor, and to what extent they foster or retard destructive condensation. Laboratory reports of the thermal factors should be obtained.

Gold, silver and aluminum sheets have the highest ratings as vapor barriers and reflectors of radiant heat. But aluminum may be had at a very low cost in the form of multiple accordion sheets which automatically create reflective air spaces and surfaces when installed.

Multiple accordion aluminum has high reflectivity (97%) and low emissivity (3%) for heat rays; low conduction because of preponderant air spaces of slight density. Its aluminum and fiber layers retard convection.

The aluminum sheets are long, continuous, and impervious to water vapor. Infiltration under flat, stapled flanges is slight. The scientific construction of multiple layers of accordion aluminum, fiber, and air spaces minimizes condensation formation on or within this type of insulation. Its slight mass has little heat storage capacity.

An improved* multiple accordion aluminum, now on the market as Infra Insulation, Types 6-S*i* and 4-S*i* gives the entire area between joists, including the edges, maximum protection against heat loss and condensation formation. Send coupon for free sample.

*U. S. Patent Applied For

COST OF INFRA INSULATION INSTALLED
in new construction between wood joists, material with labor,

Type 6-S*i* under 9½¢ sq. ft.
Type 4-S*i* under 7½¢ sq. ft.

INFRA INSULATION INC.
525 Broadway, N.Y.C., Dept. V-4
☐ Please send samples of new Infra
☐ Information
Name_____
Firm_____
Address_____

INFRA INSULATION, INC., 525 Bway., New York, N. Y. WOrth 4-2241

also describes methods of storing higher-rank coals. The study outlines methods of building satisfactory storage piles at industrial plants and on government property. Failures resulting from unsatisfactory storing are also discussed.

The Department of Defense had about completed, late in March, a study of boiler capacity available, as compared with capacity which might be needed in an emergency. The report is one of a series of studies of capacity and requirement reflecting ability to produce military end items during a major military effort.

Red Faces

There were some red faces at the Pentagon—Department of Defense Headquarters—when the DOD released the first edition of a new Production Record to be submitted semi-annually to the Assistant Secretary for Supply and Logistics. The record was supposed to provide an accurate picture of production and procurement schedules for selected types of military equipment.

In this instance the report was all too detailed, for it inadvertently includes names, descriptions, specifications and quantities of some of the Defense Department's secret weapons. Included were data on guided missiles of half a dozen different types. together with information about tanks, guns and atomic weapons.

Unless the current slipup results in cancellation of the plan, the report system will represent the Defense Department's latest effort to compile realistic estimates of requirements, and to keep in touch with them through effective production schedules.

In another effort to determine where we stand with regard to defense requirements, the Army, Navy, and Air Force have been ordered to keep careful check on the condition of all industrial plants which they own, as well as those over which they have jurisdiction as a part of the National Industrial Reserve.

Objective of the order, as outlined in Department of Defense Instruction 4155.4, is "to establish procedure for evaluating the general state of readiness of industrial installations, and to insure that planning for the utilization of these installations is in consonance with the actual physical condition of the plants. Inspections must be made by the services at least every calendar year, with reports filed within 60 days with Assistant Defense Secretary Franklin G. Floete.

How to handle defense plants when, happily, there is no need for their output, is proving to be an unhappy problem for the Office of Defense Mobilization. Defense Mobilization Director Arthur S. Fleming finds that the plants fall into several classifications. Included are:

Plants where one pilot line might be kept running slowly and the remainder of the plant be converted to civilian production.

Single-purpose plant where the tools can be kept in special storage, and the floor space turned back to private use.

Plants into which both machines and plant go into mothballs as part of the National Industrial Reserve.

Plants which could be leased or sold, subject to repossession under a National Security Clause.

Problems involved with any of the foregoing categories include how to keep a nucleus of well trained employees if only a pilot line is to run, and what to do if machinery is such as to be difficult to move or store in the event a part of the plant is needed for civilian production.

Small Business Concerned

With the defense budget being cut back, small business is beginning to notice that its share is smaller, percentagewise, than ever before. The annual report of the Senate Small Business Committee pointed out some of the problems of the smaller business organization, and urged that steps be taken to correct them. The committee urged that the Defense Department take a second look at what Congress has had to say about giving small business every possible break when awarding defense contracts. Changes in the tax laws, to encourage capital investment in small business, were also suggested. Credit needs of small businessmen were also discussed, with a recommendation that Congress establish an insured-loan plan similar to FHA. The committee was also concerned over mergers which make big firms bigger, and progressively weaken the position of small businesses.

Washington Miscellany

Nickel Re-Control Likely. A Defense Mobilization Order recontrolling nickel is possible—not alone because of an actual shortage of supplies but because of unequal distribution. Supplies are admittedly tight, but the principal complaint reaching the Office of Defense Mobilization is that available stocks are being channeled to "favored buyers". The ODM is reluctant to reimpose controls, for the reason that the stockpile and military requirements would then be officially front-row, with civilian industry standing in line behind. ODM folks are hoping that industry will straighten out its nickel distribution problem without outside interference.

Noise Control Studied. Air-conditioning engineers whose projects include a study of noise control will find food for thought in two recent studies published by the Commerce Department's Office of Technical Services. The reports, summarizing extensive research done at the Wright Air Development Center, are in two volumes. They cover the entire field of noise control, including the effects of noise on both individuals and communities. The studies appraise existing techniques and propose new methods and equipment for noise control.

The publications, priced at $4 and $3 each, may be secured from the Office of Technical Services, Room 6227, Commerce Building, Washington, D. C. Titles: "Handbook of Acoustic Noise Control, Volume 1, Physical Acoustics", and "Handbook of Acoustic Noise Control, Volume II, Noise and Man".

Electric Output Up Again. Despite some complaints about curtailed business, the electric power output for January, and for the year ended January 31, set new records. The year-end figure was 445,045,156,000 kwh—up 10.8% over the 401,659,899,000 kwh for the year ended January 31, 1953. The January figure was up .9% over the previous record, December, 1953.

Refining Expansion Goal. The Petroleum Administration for Defense, working toward an expansion in refining capacity of 1,750,000 barrels by January 1, 1956, has found itself 145,000 barrels short of its goal. In an earlier estimate, PAD had indicated that the goal was much closer than the current survey indicates.

more in '54 PACKAGED AIR CONDITIONERS

NEW BRUNNER AIR CONDITIONERS

— in a variety of models for within-room or duct installation, are available in 2, 3, 5, 7½, 10, 15 and 20 H.P. sizes. Completely self-contained, easy to install, easy to service.

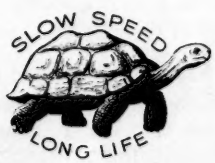
GOOD THINGS come in these large "packages"

There are several good things you'll like about the new line of Brunner "packaged" Air Conditioners. One thing, of course, is the full range of sizes and models which permit wide freedom in application planning. The simplicity of installation is welcomed, too — plenty of savings there.

And — another good thing about *all* Brunner Air Conditioners is the famous Brunner slow-speed condensing unit that means longer service life, less maintenance, lower operating costs—greater satisfaction all around for you—and your customers. In sizes up to 20 H.P., these Brunner packaged conditioners are engineered for *dependability* and trouble-free performance.

See these outstanding Brunner Air Conditioners . . . see *all* the "good things" in this great packaged line for 1954 . . .

BRUNNER MANUFACTURING CO., Dept. K-44, UTICA, N.Y.
The Brunner Co., Gainesville, Ga.
In Canada: Brunner Corp. (Canada) Limited, Toronto, Ontario



BRUNNER SINCE 1906 means more in '54

POST

BRUNNER AIR CONDITIONING IS ADVERTISED IN THE SATURDAY EVENING POST

BRIEFLY STATED

• Chester S. Stackpole has been appointed general sales manager of the Union Asbestos and Rubber Company's Heating and Cooling Division. Mr. Stackpole was formerly vice president and general sales manager of the Chrysler Corp.'s Airtemp division and previously was vice president of the Eureka-Williams Corp.'s Williams division.

• The appointment of L. D. Mandell as general sales manager of Kritzer Radiant Coils, Inc., Chicago, manufacturers of radiant baseboard, fin-pipe coils, and radiant panel heating systems is announced by Henry W. Kritzer, president. Mr. Mandell formerly was vice-president of C. A. Dunham Co., Chicago.

• Two scientists who have made significant contributions toward a better understanding of corrosion control received the 1954 National Association of Corrosion Engineers' Awards. Dr. Irving A. Denison, now of the Diamond Ordinance Fuze Laboratories, is best known among corrosion workers for his research at the National Bureau of Standards on soil corrosion. He received the Willis Rodney Whitney Award. E. H. Dix, Jr., whose contributions in the better understanding of corrosion processes in aluminum and magnesium alloys date to 1919, is assistant director of research at Alcoa. He received the Frank Newman Speller Award. The Whitney award in recognition of contributions to corrosion science and the Speller Award in recognition of achievements in corrosion engineering. The ceremony was at the NACE annual banquet, March 17, at Hotel Muehlebach, Kansas City.

• A new $1 million manufacturing building in Louisville, Kentucky now houses the production facilities for Amerglas furnace and air conditioning filters. According to F. Robert Walker, sales manager, the Amer-glas Division of American Air Filter Co., Inc., will be able to double former production.

• The signing of a contract under which Pittsburgh Plate Glass Co. has agreed to purchase the fiber glass manufacturing facilities and other assets of the Glasfloss Division of Tilo Roofing Co., Inc., has been announced jointly by Richard B. Tucker, executive vice president of Pittsburgh Plate Glass Co., and R. J. Tobin, president of Tilo Roofing Co., Inc. Assets of the Glasfloss Division include the manufacturing plant at Hicksville, Long Island, New York, machinery and other equipment for fiber glass manufacture, inventories on hand, patent rights, trade marks and goodwill. Purchase price was not disclosed.

• The Hammel-Dahl Co., of Providence, R. I., manufacturers of automatic control equipment, announces the promotion of David Golner to sales manager. Mr. Golner joined the Hammel-Dahl Company in 1945 as a development engineer. Since that time he has been closely affiliated with all phases of manufacturing, sales and management.

• The reactor for a proposed atomic powered locomotive, announced in February by the University of Utah, is already on the designing boards of The Babcock & Wilcox Company's Atomic Energy Division, according to C. H. Gay, vice president in charge of the division. Mr. Gay said that such reactors employing fluid rather than solid fuel, have been previously designed but never for such a heavy demand of energy. Some of the problems include arranging for a sufficient amount of heat exchange between the fuel and the pressurized water in the limited space available and the problems of corrosion and of neutron damage.

• The Department of Industrial Medicine of New York University Post-Graduate Medical School, a unit of New York University-Bellevue Medical Center, is offering a course in Air Pollution beginning May 10, 1954. This course has been designed to acquaint industrial hygienists, stationary engineers, chemical and power plant engineers, safety engineers, insurance engineers, health officials, and others having responsibility for air-pollution control with the fundamentals of the measurement and prevention of atmospheric pollution. The sessions will be held daily, morning and afternoon, for two weeks Application should be made two weeks prior to the beginning of the course through the Office of the Dean, New York University Post-Graduate Medical School, 477 First Avenue, New York 16, N. Y. Tuition: $60.

• The appointment of S. C. Rothmann as new director of the City of Philadelphia's Division of Air Pollution Control was recently announced by Dr. Norman R. Ingraham, Acting Health Commissioner. Mr. Rothmann will fill the position vacated by the resignation of John R. Hodges in December 1952. In the interim, Newell K. Chamberlin, executive director of the Air Pollution Control Board, has filled the position. Mr. Rothmann comes to Philadelphia from the University of California at Los Angeles, where as industrial hygiene engineer he was responsible for the engineering control of atmospheric contaminants for the four southern campuses, research centers and field stations of the University.

• Albert Hanson, vice president of Drayer-Hanson, Inc., Los Angeles, Cal., has presented to Julian A. McPhee, president of California State Polytechnic College of San Luis Obispo, California, funds to cover a full, four-year scholarship in air conditioning and refrigeration. This is the only curriculum and full four year scholarship offered in the country that leads to a B.S. degree in air conditioning and refrigeration.

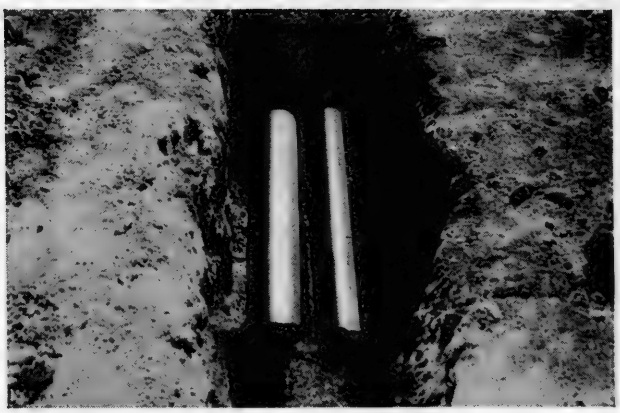
• Harold P. Mueller, President of the L. J. Mueller Furnace Company, and Hobart C. Ramsey, President of the Worthington Corporation, announced jointly an agreement for the transfer of the net assets, name and goodwill of Mueller to Worthington in exchange for Worthington common stock. Mr. Ramsey stated that the Mueller plant and facilities would be operated as the Mueller Climatrol Division of Worthington, and that the entire working force and management of the present staff will be continued in their present positions.

• Charles V. Bengle has been appointed manager of the Applied Systems Section in Air Conditioning and Refrigeration at Harrison Works of Worthington Corp. Mr. Bengle joined Worthington Holyoke Works in 1942 as an application engineer and has served successively as air conditioning and refrigeration district representative in Worthington's Cincinnati, Nashville, and Detroit offices.

3 Big Reasons Why

1. GILSULATE—Easy to install—Just pour it on, tamp it down and backfill. Run heat through the pipes (up to 520°F)...and the job is completed. No need to remove rocks from backfill; no problems of cramped space or multiple piping.

more and more hot underground pipe gets insulated



2. GILSULATE—Cost Less per Installed Linear Foot—No skilled labor needed...requires no mechanical sheaths, special protective devices, or costly installation procedures.

with new modern triple-zone GILSULATE®

ZONE 1 Dense, semi-plastic coating bonded tightly to pipe surface. This Zone is waterproof and a thermal and electrical insulator.
ZONE 2 Sintered zone provides excellent thermal insulation under wet or dry conditions. Zone 2 is also waterproof.
ZONE 3 Unconsolidated GILSULATE particles provide excellent thermal insulation and a high load carrying capacity.
PIPE WALL

3. GILSULATE—Delivers Permanent Triple-Zone Protection—Three tough, massive circular sheaths completely and permanently protect the pipe, cut heat loss down to 8% to 11% of bare buried pipe. Triple-zone protects against all buried line corrosion conditions: water, roots, acid, alkalis, bacteria, etc.

Fill in coupon for complete details.

GILSULATE®

THE TRIPLE-ZONE INSULATION
FOR LIFETIME PROTECTION
OF HOT UNDERGROUND PIPES

AMERICAN GILSONITE COMPANY, SALT LAKE CITY, UTAH
Affiliate of Barber Oil Corporation and Standard Oil Company of California
Distributors in principal cities of United States and Canada

American Gilsonite Company
134 West Broadway
Salt Lake City, Utah

Please send me further information on GILSULATE

NAME.....

TITLE.....

COMPANY.....

ADDRESS.....

HV

1854 · 1954

our 100TH year

OF SUCCESSFUL MANUFACTURING EXPERIENCE

YOU'LL SELL MORE PROFITABLE JOBS

with the complete line of

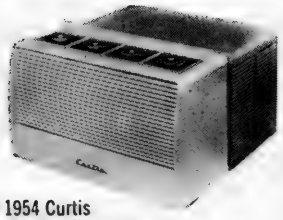
Curtis

AIR CONDITIONING AND REFRIGERATION EQUIPMENT

Every product in the Curtis line is built with quality material and workmanship.

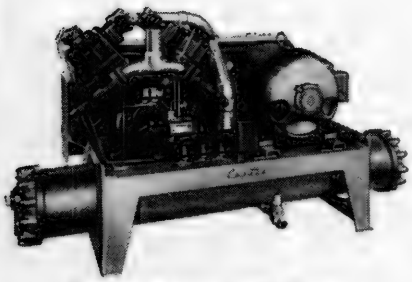
Curtis equipment is known around the world for its dependability and efficiency.

With the complete Curtis line, you can handle any installation for **Home, Office, Store,** or **Factory.**

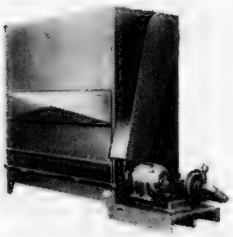


NEW 1954 Curtis Room Air Conditioner — an attractive, efficient unit with a BIG market potential

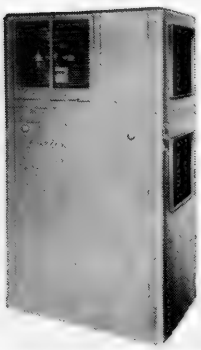
Packaged Units— 2, 3, 5, 7½ and 10 tons Choice of open or semi-hermetic compressors... and 15 ton packaged Central type units



Condensing units—through 80 tons



Evaporative Condensers, Cooling Towers and Air Handling units to match



Residential cooling and heating units

You may qualify for a direct factory franchise. Write us, using your company letterhead.

National advertising in *Saturday Evening Post, Time, Newsweek* and *House and Home,* plus many other publications helps sell Curtis to your customers and prospects. Attractive new sales literature is available to help you sell in your local area.

765

CURTIS REFRIGERATING MACHINE DIVISION
OF CURTIS MANUFACTURING CO.
1999 KIENLEN AVENUE
ST. LOUIS 20, MISSOURI

We're a "SHIRT-SLEEVE" Outfit!

From our top executives right down the line, we're always available to give personal service to the needs of any customer, large or small. We pride ourselves on the dispatch with which we get things done without red tape.

Wholesalers all over the country, tell us this personal service by the "top brass" is one of the main reasons why they like to do business with Reading. They've found that Reading's "shirt-sleeve" service means they can always depend on getting fast delivery of the type and size tube they want in the quantity they need. This streamlined service, plus uniform high quality second to none in the industry, has led to a growing preference for Reading Copper Tube.

READING TUBE CORPORATION

EMPIRE STATE BUILDING, NEW YORK 1, N. Y.

Depots

- Reading, Pa.
- Woodside, L. I., N. Y., 57-15 Northern Blvd.
- Chicago, Ill., 724 W. 50th St.
- Houston, Texas, 1121 Rothwell St.
- Atlanta, Ga., 690 Murphy Ave., S. W. Unit 5, Bldg. B
- Cleveland, Ohio, 4615 Perkins Ave.

READING COPPER TUBE

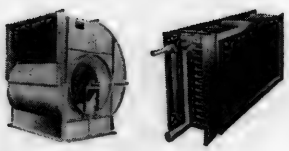
Sold Through Wholesalers Only

Now...Trane CenTraVac in for your larger

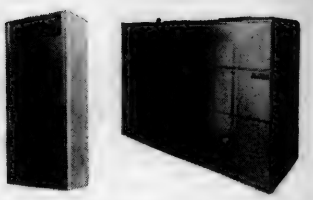
New hermetic centrifugal compressors boost water chilling equipment in new sizes and types provides

Trane Evaporative Condenser. Use where water is scarce or expensive. Cuts water consumption as much as 90%.

Trane Multi-Zone Climate Changer. Air conditions up to 6 zones at once — each zone can have different conditions. 450 to 23,400 cfm.



Trane Fans and Coils. Fans, Class I and II, backwardly inclined or forward curved. Coils for steam, hot water, cold water or direct expansion refrigerants.

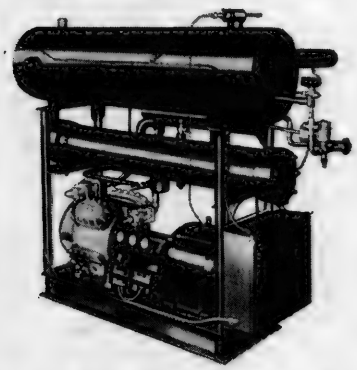


Trane Self-Contained Units. 3 to 20 tons. Heating coil optional. Built-in evaporative condenser optional with 10, 15, 20-ton units.

3 new sizes air conditioning jobs!

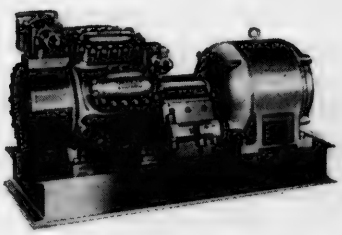
capacity up to 400 tons . . . Other Trane air conditioning increased design flexibility

CenTraVac Water Chiller in 3 new sizes tops the list of TRANE air conditioning equipment that has been widened again to enable you to design more efficiently, more economically than ever! CenTraVac single-unit capacities now range from 45 to a maximum of 400 tons. Hermetic centrifugal refrigeration unit completely self-contained. Starts, stops, modulates automatically. Lets you design systems that adjust automatically to varying cooling needs with power savings almost directly proportional to load variations. Requires no special bases.



4 New Cold Generator sizes—30, 60, 75 and 100 tons—expanded line now provides water chilling capacities from 10 to 100 tons. Complete refrigeration cycle . . . factory engineered, assembled, tested, guaranteed. A single unit, wired, piped and refrigerant-charged. Includes condenser, refrigerant piping, liquid cooler, control valves, motor and accessories. Only simple plumbing and electrical hook-up required.

3 New Reciprocating Compressor units—60, 75 and 100 tons—extend the line from 10 to 100 tons. TRANE compressors are smoother, quieter, longer-lasting. Maximum performance in minimum space. Direct drive. Factory-assembled. Easy to install. Automatically modulate capacity to match variations in cooling demand, slash power consumption. Available with shell-and-tube condenser.



Trane UniTrane room units use chilled or hot water. Individual control. Free-standing, recessed or ceiling models.

What kind of system are you planning? Large . . . small? Simple, complex? Cooling only or a complete air conditioning installation? Enjoy advantages of undivided responsibility and a single source of supply by specifying TRANE equipment. Before you plan your next job, get all the facts on complete TRANE line. Contact your TRANE Sales Engineer or write TRANE, La Crosse, Wis.

one source
one responsibility...

TRANE

The Trane Company, La Crosse, Wis. • East. Mfg. Div., Scranton, Penn. • Trane Co. of Canada, Ltd., Toronto
87 U.S. and 14 Canadian Offices.

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

Here's why more and more of America's famed buildings are installing the Yorkaire system of air conditioning

The YORKAIRE SYSTEM brings new standards of comfort to the modern miracle of air conditioning, yet see how simple it is, how easy to understand! . . .

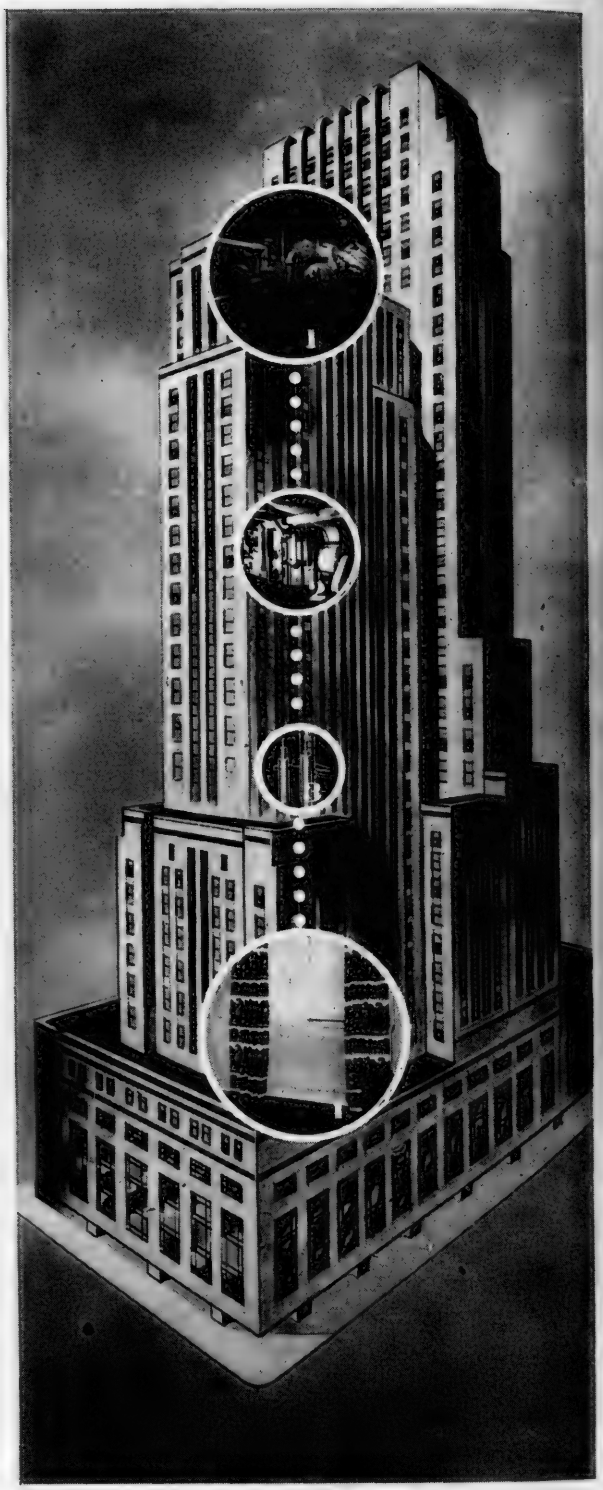
1 Source of comfort cooling is the famous and rugged York Turbo Water Cooling System which may be located on the roof of the building or in the basement.

2 Great volumes of air are brought into the building from outdoors at convenient points. This "raw" air is filtered, washed, cooled or heated, and conditioned for the right amount of moisture. When it's "just right for comfort," it begins its swift, silent journey to you.

3 Through small, space-saving, tightly sealed tubes the conditioned air is sent under mild pressure, branching out at each floor to the individual rooms. At the same time, small pipes carry hot water in winter and cold in summer to help you obtain the temperature you want.

4 In room units under the windows the air tube and water pipes converge. These units distribute the conditioned air in a gentle, quiet stream. A simple control allows you to refine the temperature to the conditions you desire, with no mixture of air from other rooms.

YORKAIRE SYSTEMS of Air Conditioning are being installed in building after building, old and new, across the country.

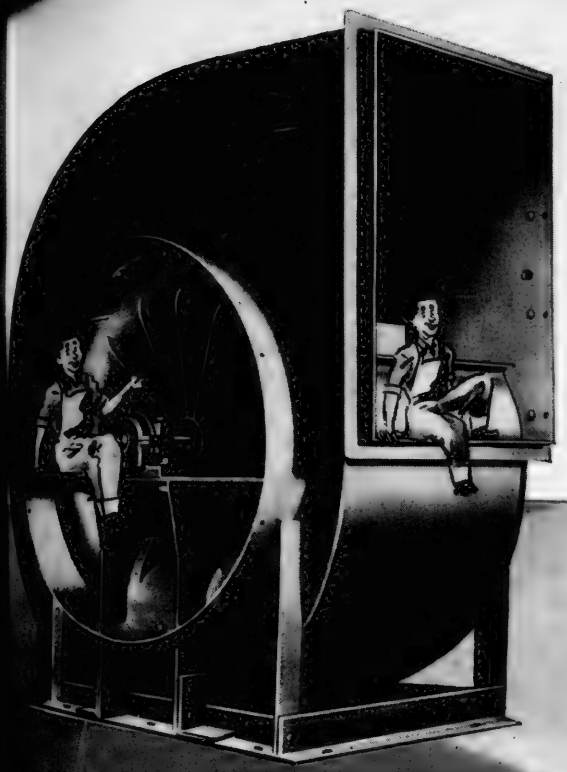


air conditioning by york

. . . Recent contracts include these famous buildings—Mile High Center, Denver; Netherland-Plaza Hotel, Cincinnati; Fulton National Bank, Atlanta; Equitable Life Assurance Society, San Francisco; Esso Standard Oil Company, Philadelphia. If you are not now enjoying this healthful comfort, perhaps you will, sooner than you think.

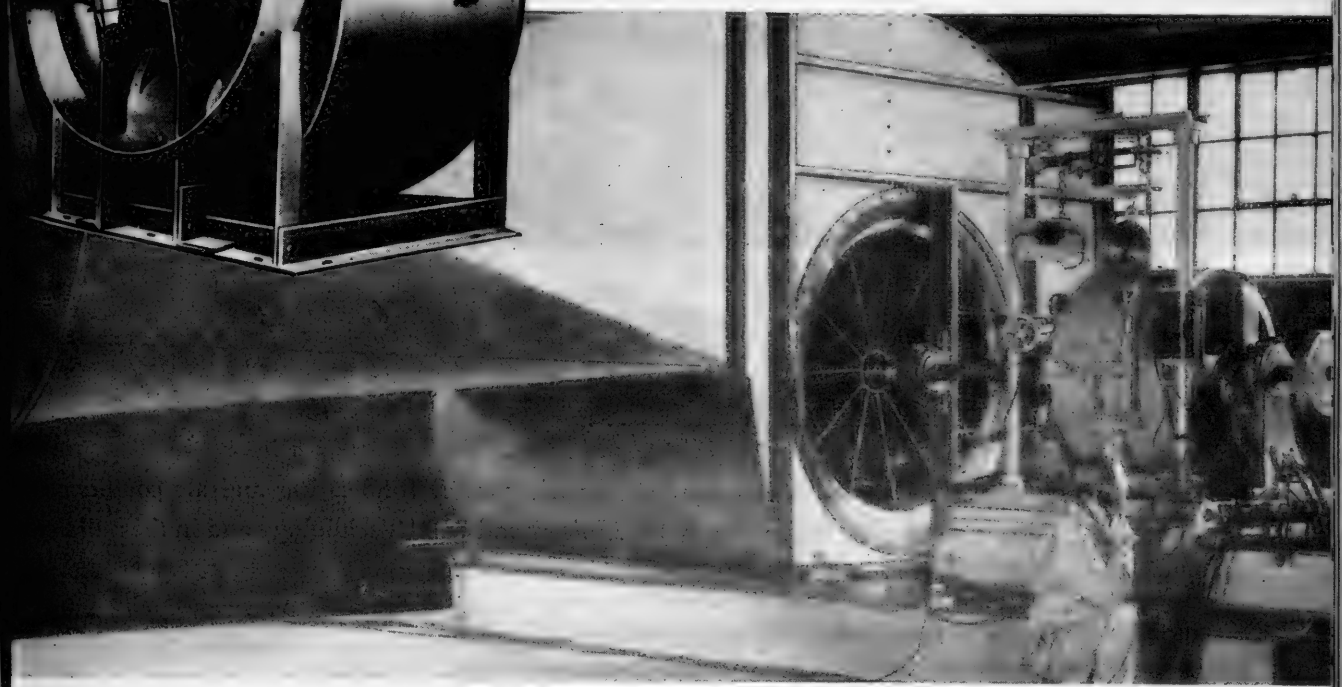
YORK CORPORATION York YORK, PA.

HEADQUARTERS FOR MECHANICAL COOLING SINCE 1885



FROM INLET TO OUTLET
HERE'S MORE AIR PER DOLLAR

. . . WHEN YOU SPECIFY "BUFFALO" TYPE BL FANS



Even before incoming air reaches the wheel of the "Buffalo" BL Fan, it is guided in the most efficient path. The inlet bell is smoothly curved for absolute minimum friction; while the welded-on stationary inlet vanes reduce turbulance and assure rated air delivery even if inlet conditions are unfavorable. The "Buffalo" inlet is one reason why "Buffalo" air-moving costs are low.

The new improved "Buffalo" rotor, too, vitally affects performance. Here the full-curvature die-formed shroud and the backward curved blades move the air through the specially shaped housing and outlet with smoothness, quietness and efficiency. In addition, the fan's performance is stable from shut-off to free air delivery.

Besides these and other features, there is an intangible in all "Buffalo" fans that has always made for high satisfaction. We call it the "Q" factor, or built-in quality which provides long life and freedom from trouble. This is the sum total of the 77 years of "Buffalo" experience and know-how that goes into every fan to leave our plant.

"Buffalo"

For further details on "Buffalo" Type BL Fans, write for new Engineering Bulletin F-100

BUFFALO FORGE COMPANY

480 Broadway Buffalo, N. Y.

PUBLISHERS OF "FAN ENGINEERING" HANDBOOK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

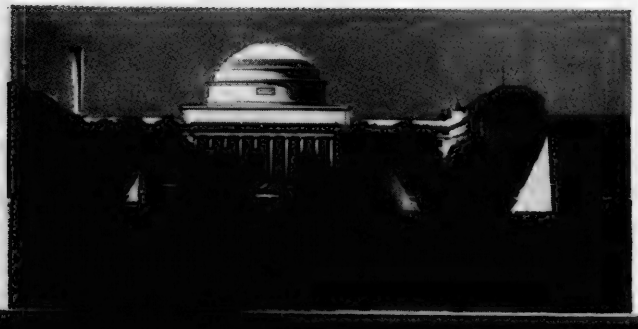
Sales Representatives in all Principal Cities

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

Another M. I. T. Building Equipped

In this Famous Scientific Institute Powers thermostatic control for heating and air conditioning systems is used in the new Dorrance Laboratory for Biology and Food Technology and in the buildings listed below.

- **MAIN EDUCATIONAL AND ADMINISTRATION BUILDINGS**
- **GAS TURBINE LABORATORY**
- **CHEMICAL ENGINEERING BUILDING**
  Architects: Coolidge and Carlson • Contractor: The Downey Co.
- **HAYDEN MEMORIAL LIBRARY**
  Architects and Engineers: Vorhees, Walker, Foley and Smith
  Contractor: Cleghorn Co.
- **NUCLEAR SCIENCE LABORATORY**
  Architects: Anderson & Beckwith • Contractor: The Merrill Co., Inc.
- **SWIMMING POOL BUILDING**
  Architects: Anderson & Beckwith
  Engineers: Wolff & Munier • Contractor: H. E. Whitten Co.
- **NEW AUDITORIUM, now under construction**
  Architects: Eero Saarinen & Associates
  Associate Architects: Anderson & Beckwith
  Engineer: Hyde & Bobbio • Contractor: H. E. Whitten Co.



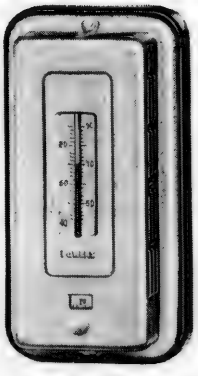
Other Prominent Users of

UNITED STATES CAPITOL
House and Senate Chambers
UNITED NATIONS
General Assembly
and Conference Buildings
HARVARD UNIVERSITY
Various Prominent Buildings

POWERS CONTROL

Argonne National Laboratory • Abbott Laboratories
Aluminum Co. of America • American Telephone & Tel. Co.
American Optical Co. • Anheuser Busch Co. • Armour & Co.
Bendix Aviation Corp. • Bachman-Uxbridge Worsted Co.
Campbell Soup Company • Celanese Corp. of America
Chrysler Corp. • Ford Motor Co. • General Motors Corp.
Douglas Aircraft Co. • E. I. DuPont de Nemours Co.
Esso Research Center • Eastman Kodak Co.
B. F. Goodrich Tire & Rubber Co. • Humble Oil Co.
Johns Manville Co. • Johnson & Johnson Co.
Lever Brothers Co. • Eli Lilly & Co. • Lily Tulip Cup Corp.
Lahey Clinic • Massachusetts General Hospital
Massachusetts Mutual Life Insurance Co.
Monsanto Chemical Co. • Montgomery Ward & Co.
Parke Davis & Co. • Pepperell Mfg. Co. • Sears Roebuck & Co.
Sharp & Dohme Inc. • Swift & Co. • Thompson Products, Inc.
Wm. Wrigley Co. • Hiram Walker Inc. • Wyman-Gordon Co.
New York Stock Exchange • Radio City Music Hall
Madison Square and Boston Garden • Rockefeller Center

with a POWERS Pneumatic System of *Temperature Control*



Powers Room Type Thermostat pneumatically regulates heating and air conditioning systems. Outstanding for accuracy and dependability.

Laboratory with an Exciting Future — From this modern laboratory with its excellent staff and research facilities will come great advances that will surpass the progress of the past and produce discoveries which will benefit us all.

Correct room temperature and humidity is important here. Research labs, animal rooms, constant temperature rooms and classrooms require the even, constant temperature assured by a Powers control system.

When you want dependable, accurate control for heating, cooling or air conditioning for any building or industrial process call Powers. With over 60 years of experience and efficient modern equipment we can help you select the best control for your requirements.

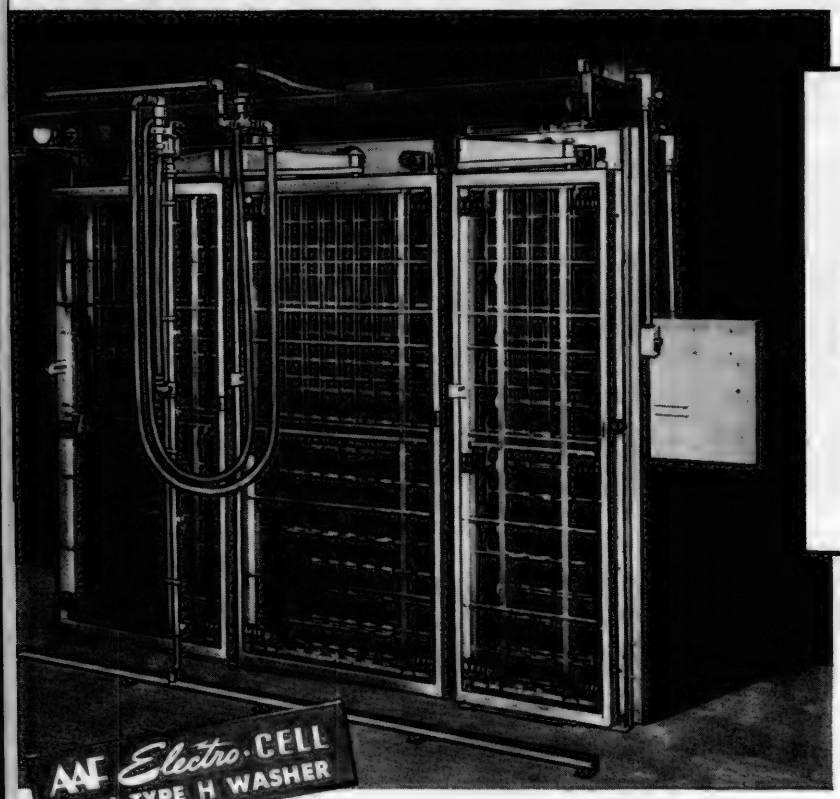
THE POWERS REGULATOR CO.

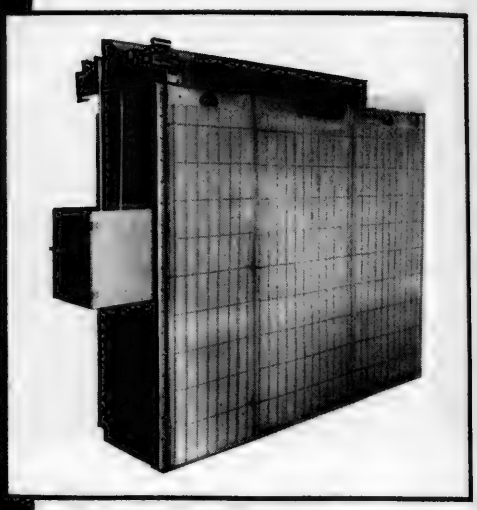
OVER 60 YEARS OF AUTOMATIC TEMPERATURE CONTROL

SKOKIE, ILLINOIS • Offices in Over 50 Cities in U. S. A., CANADA and MEXICO

(b46)

Rx ELECTRONIC AIR



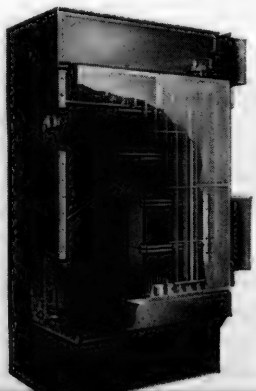


Rear view of Electro-Cell showing water eliminators consisting of Amer-glas pads which serve to catch any surplus spray escaping plates during operation of the Type H Washer.

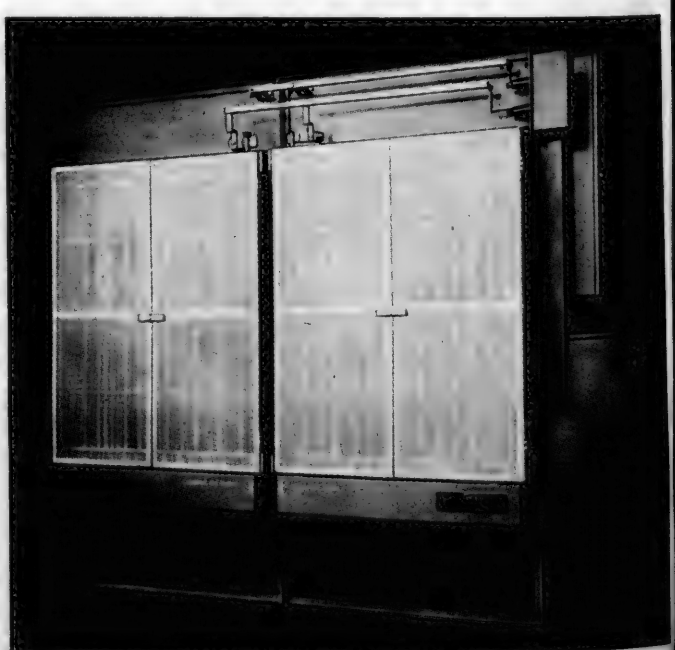
A stationary, plate-type electronic precipitator having a rated efficiency of 90% by the Discoloration Test Method. Addition of the new Type H Washer provides push-button control of complete cleaning operation. Washing and re-oiling of collector plates are accomplished by two separate sets of spray nozzles which travel the full width of the precipitator. Both operations are fully automatic after starting button is pushed. If manual cleaning is preferred, the Electro-Cell's collector plates may be washed and re-oiled in place or easily removed for inspection.

AAF Electro-MATIC

A high efficiency (85 to 90% by the Discoloration Test Method), self-cleaning electronic precipitator which automatically eliminates the messy job of washing and re-oiling collector plates and disposing of the precipitated material. Even more important, this exclusive self-cleaning feature minimizes the personal element as a factor of performance and permits continuous operation at maximum efficiency.



Cutaway view of Electro-Matic showing method by which collector plates are cleaned daily by automatic immersion in oil bath to maintain maximum precipitation efficiency.



CLEANING TO YOUR PRESCRIPTION

ONLY AAF OFFERS ELECTRONIC PRECIPITATORS IN A RANGE OF EFFICIENCIES WITH A CHOICE OF MAINTENANCE METHODS

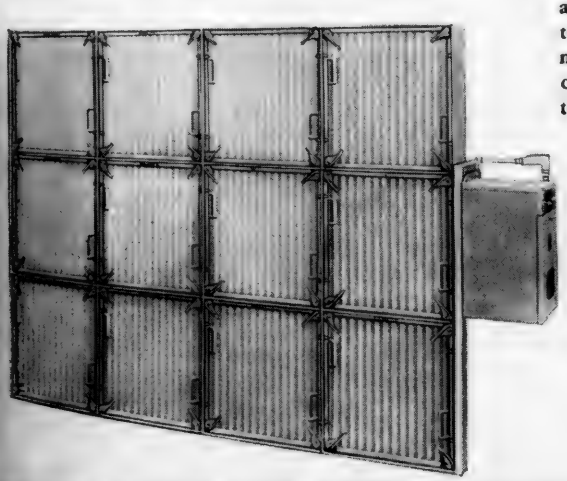
Clean air is our business but the degree of cleanliness desired and the manner in which it is achieved is definitely *your* business. That's why AAF has developed this line of three electronic precipitators. All are highly effective in the removal of dust and smoke, with efficiencies ranging up to 90%—while each offers a different method of maintenance. In addition to the basic benefits, AAF's complete line assures you equipment in a wide range of sizes and air volumes to fit a variety of space requirements—with initial costs varying as to your needs.

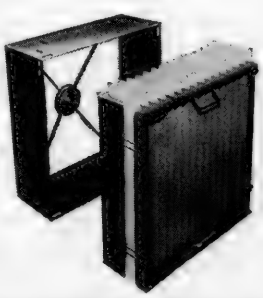
Examine the three units on these pages. Note the features which recognize both the human and dollar factors in those all-important problems of maintenance and performance. That's AAF Research at work—designing clean air to *your* prescription.

Complete information on these Electronic Precipitators is yours without obligation. Remember, too, AAF engineers (the same men who design the products) are always available to point out the short cuts and savings that invariably result with the complete understanding of an air cleaning problem. Call your local AAF representative or write us direct.

AAF Electro·PL

A low-cost, dry-type electronic air filter that combines dry filtration and electronic action. Should the electronic action become inactive, the air will continue to be filtered by the dry-type Airmat media. Maintenance is easy and convenient. No oil is required to retain the precipitated dust. No water and necessary sewer connections are needed for the cleaning operation. When the Airmat paper has accumulated a full dust load, it is discarded and replaced with clean media. Material cost is low and, with every replacement, filter is returned to its original efficiency.





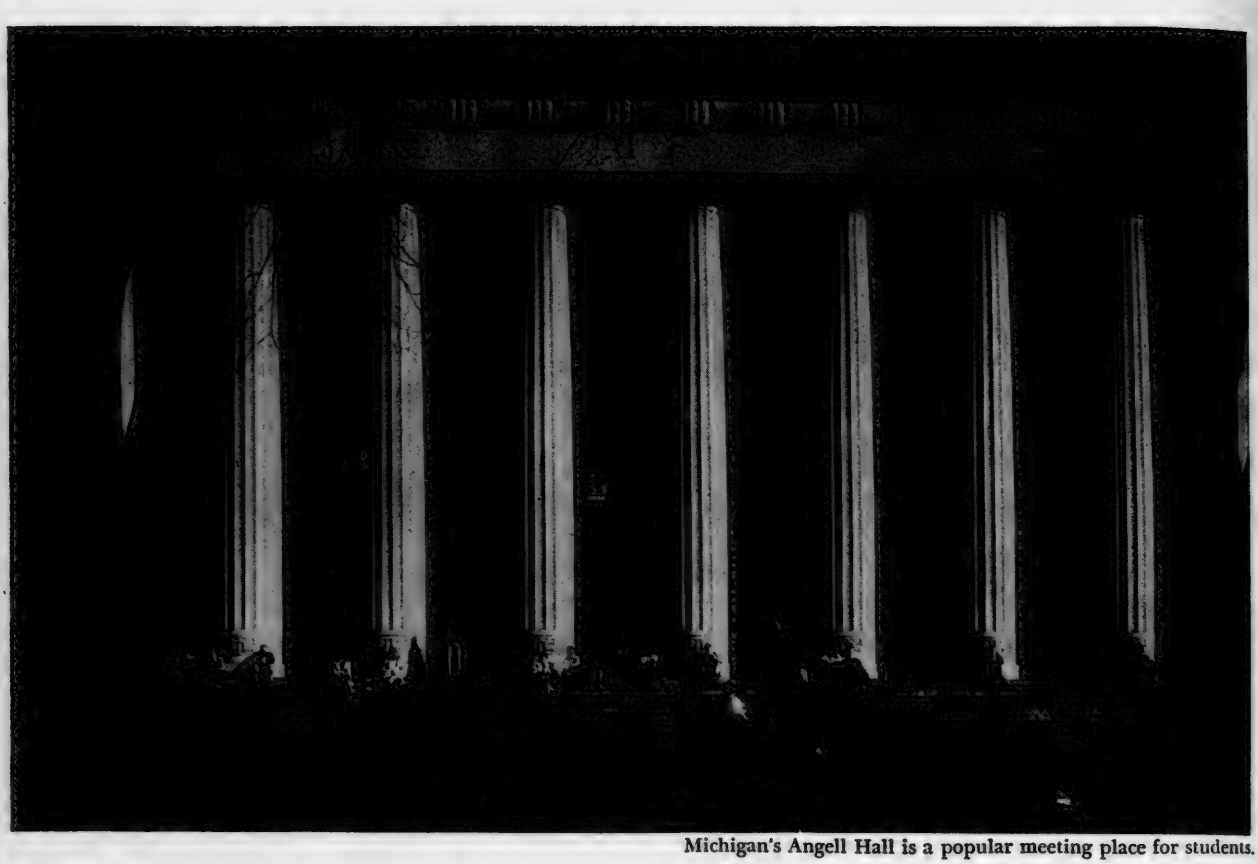
Two components make up an Electro-PL unit—a frame and collector element. The frames, which support the collector elements, are riveted together to form a permanent assembly. Electrical potential for the collector element is supplied by center contact at rear of the frame.

American Air Filter

COMPANY, INC.

[illegible] Avenue, Louisville 8, Kentucky • American Air Filter of Canada, Ltd., Montreal, P. Q.

AAF®



Michigan's Angell Hall is a popular meeting place for students.

American Blower goes to college

UNIVERSITY OF MICHIGAN uses
American Blower air-conditioning and ventilating equipment in many of its campus buildings

Students from all parts of the globe come to Ann Arbor to attend the University of Michigan — world-famous center for higher education. Good ventilation is a must for student comfort in classrooms, lecture halls and residence halls.

For example, Angell Hall is the largest classroom building on the U. of M. campus. Every day, thousands of students attend classes here. Yet, throughout each day, rooms are comfortable and well ventilated — thanks to American Blower Supply and Exhaust Fans, Humidifiers and Heating Coils that are part of the building's conditioned-air system.

Other American Blower equipped buildings on campus are the Kresge Medical Research Building and Institute, Woman's Hospital, Outpatient Building, School of Public Health, Law Quadrangle, men's South Quadrangle Residence Hall — and many, many more!

American Blower engineers have a complete knowledge of the air cycle and the special problems of many industries. If you have an air-handling problem, phone your nearest American Blower or Canadian Sirocco Branch Office.

Each of the five Air-Tempering Units in Angell Hall consists of an HS Supply Fan (rated 58,425 cfm), a Capillary Air Washer and Heating Coils. American Blower equipment in other U. of M. buildings includes: Supply and Exhaust Fans, Capillary Air Washers, Heating Coils, Venturafin Unit Heaters, Nesbitt Syncretizers, Forced- and Induced-Draft Fans.

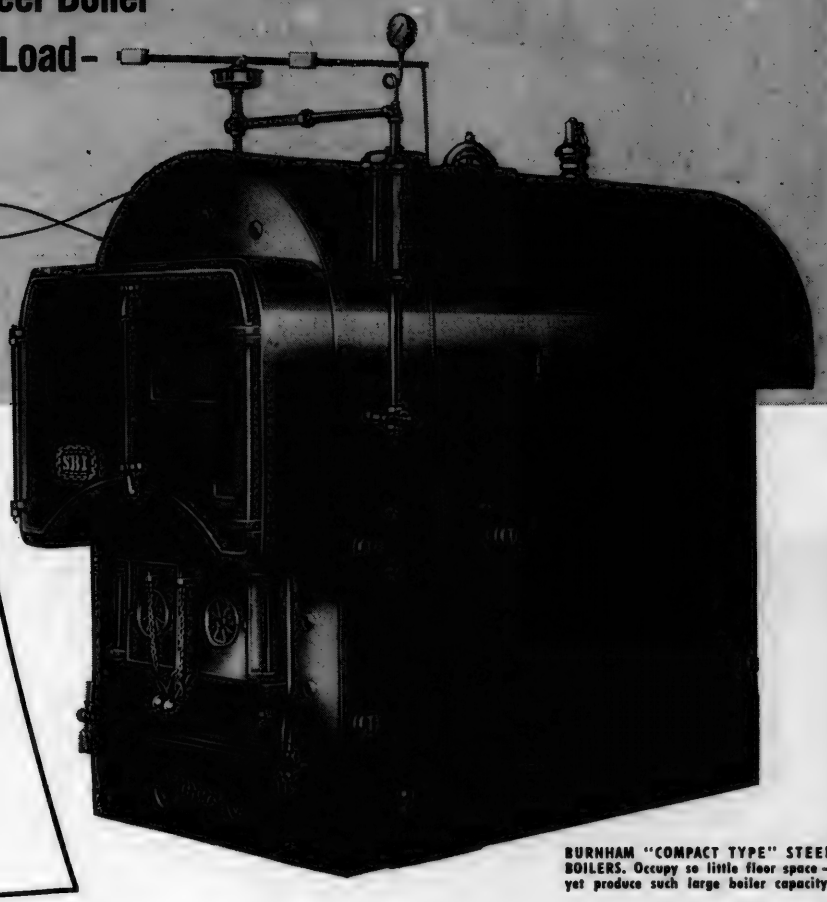
AMERICAN BLOWER

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American Radiator & Standard Sanitary Corporation

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS

BURNHAM STEEL BOILERS ARE RATED RIGHT!

...Every BURNHAM Steel Boiler is Rated for Nominal Load– NOT Top Capacity



This *Quickly* adds up to:

Greater Dependability

Longer Useful Life

Greater Efficiency

Greater Safety

Lower Costs

BURNHAM "COMPACT TYPE" STEEL BOILERS. Occupy so little floor space — yet produce such large boiler capacity.

HERE'S WHY

Conservative oldtimers are not deluded by "top capacity" ratings for a boiler. They know from long experience that only *nominal-rated* boilers give them the reserve which makes for greater efficiency, lower maintenance and longer useful life. Nominal-rated boilers mean protection against fluctuating loads, emergencies and expansion.

BURNHAM STEEL BOILERS are *all* nominal-rated, a fact you can prove for yourself or which we will gladly prove to you. They all conform fully to SBI ratings. The selection of a BURNHAM BOILER has many times been the difference between a good buy and a costly mistake. When you buy or specify a BURNHAM "COMPACT TYPE" STEEL BOILER, you automatically avoid any chance of unsatisfactory performance, arising from rating misunderstandings.

Burnham RADIANT HEATING

Burnham Corporation SBI

BOILER DIVISION

Irvington **New York**

HV-44

BURNHAM CORPORATION
Boiler Division
Irvington, New York

Please send me 8 page catalog with NOMINAL-RATINGS on BURNHAM "COMPACT TYPE" STEEL BOILERS.

Name_____

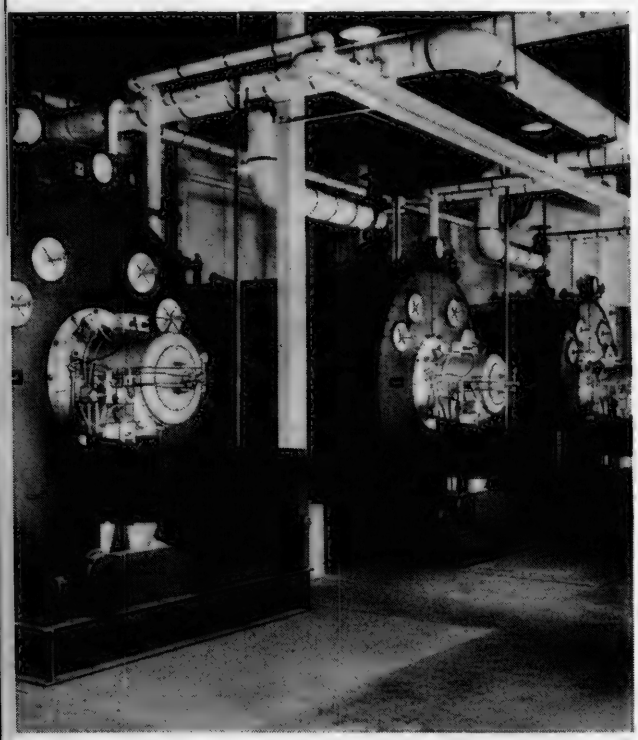
Address_____

City_____ State_____

Powermaster®

New.. exclusive....

Now . . . for the *first time* you can get packaged boiler units in the wide range of capacities from 15 to 500 HP, with *complete interchangeability of fuels* . . . light or heavy fuel oil—natural or manufactured gas—or combination gas and oil . . . and you get this cost-saving advantage *only* with *Powermaster* Packaged Automatic Boilers. Find out more about this new, wide-range service today from your *Powermaster* representative. He will help you with recommendations and suggestions for selecting the most economical units to supply steam or hot water requirements in any kind of service—industrial plants, institutions, public buildings, schools, laundries, apartment houses, hospitals, dairies, motels, and shopping centers.



- Complete Fuel Flexibility:
  Light or Heavy Oil, Any Gas or Combination Oil and Gas.
- Choice of:
  Air Atomizing VORIFLOW Oil Burner —Pre-Mix VORIFLOW Gas Burner— Combination VORIFLOW Oil and Gas Burner—All Designed and Built by O & S.
- Full-Range Modulation with VORIFLOW Combustion.
- All Middle-Range and Large Capacities.
- Selection of Automatic Operating and Safety Controls.
- Instant Change from Fuel to Fuel.

Model 3 *Powermaster*—Experienced-proved to be the standard of industry. These three 350 HP units are supplying process steam at pressures up to 200 psi.

Send for bulletins describing Model 3 and Model 4 *Powermaster* units.

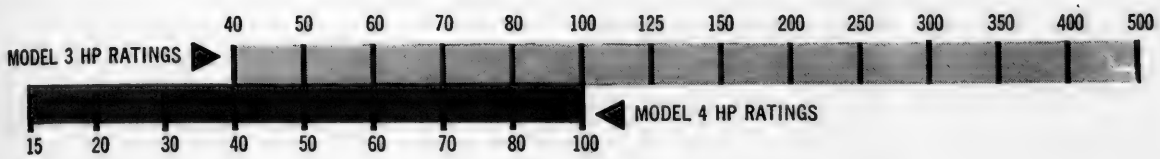
ORR & SEMBOWER, INC.

READING, PA.

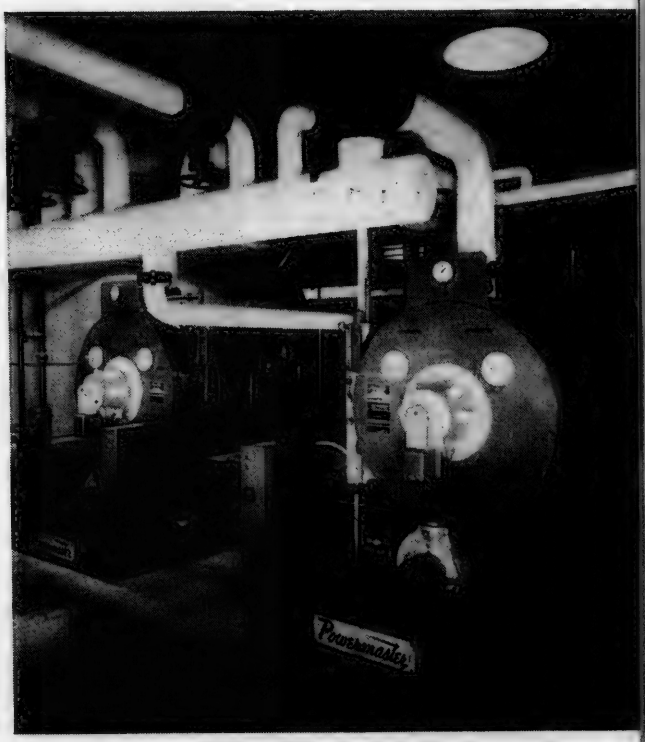
BUILDING DEPENDABLE BOILERS SINCE 1885

a choice of 2

for 15 to 250 psi. steam or hot water



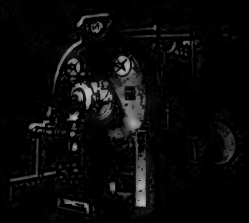
- Choice of Fuels:
  Light Distillate—Natural Gas—Manufactured Gas—Combination Oil and Gas.
- Choice of:
  Mechanical Pressure Atomizing Oil Burner—Pre-Mix Gas Burner—Combination Oil and Gas Burner—All Designed and Built by O & S.
- On-Off and Low-Fire Start Burners.
- Small and Popular Middle-Range Capacities.
- Selection of Automatic Operating and Safety Controls.
- Quick Change from Fuel to Fuel.



Model 4 *Powermaster*—Already service-proved in wide variety of successful applications. This installation of 40 HP units supplies 15 psi. steam for heating.

Powermaster®

PACKAGED AUTOMATIC BOILERS



"Combines the Esthetic and the Practical . . ."

THIS description aptly fits both the ultra-modern housing project shown here and the U·S·S NATIONAL Steel Pipe used in its construction.

In the recently completed Armstrong Court in Greenwich, Connecticut, NATIONAL Pipe is used not only in the central forced hot water steam plant which heats the huge project but in decorative hand rails and porch railings to carry out the trim, clean cut, modern appearance of the structure.

For over 60 years, U·S·S NATIONAL has been the standard pipe for conventional hot water and steam heating systems, fire control, and plumbing lines. And today it is the first choice, too, for modern radiant heating and snow melting installations. Long experience, the result of thousands of varied applications, has proved to pipe users that they can put their full confidence in the uniform, dependable, trouble-free performance of NATIONAL Pipe.

Whenever you plan your installation, regardless of the type of service called for, plan on using U·S·S NATIONAL Steel Pipe. Large or small, simple or complex, NATIONAL can fill your every pipe need.

Armstrong Court—Dramatic design in light gray brick.

Architect: Holden, McLaughlin and Associates.

Associate Architect: Joseph G. Weir

General Contractor: Frouge Construction Company

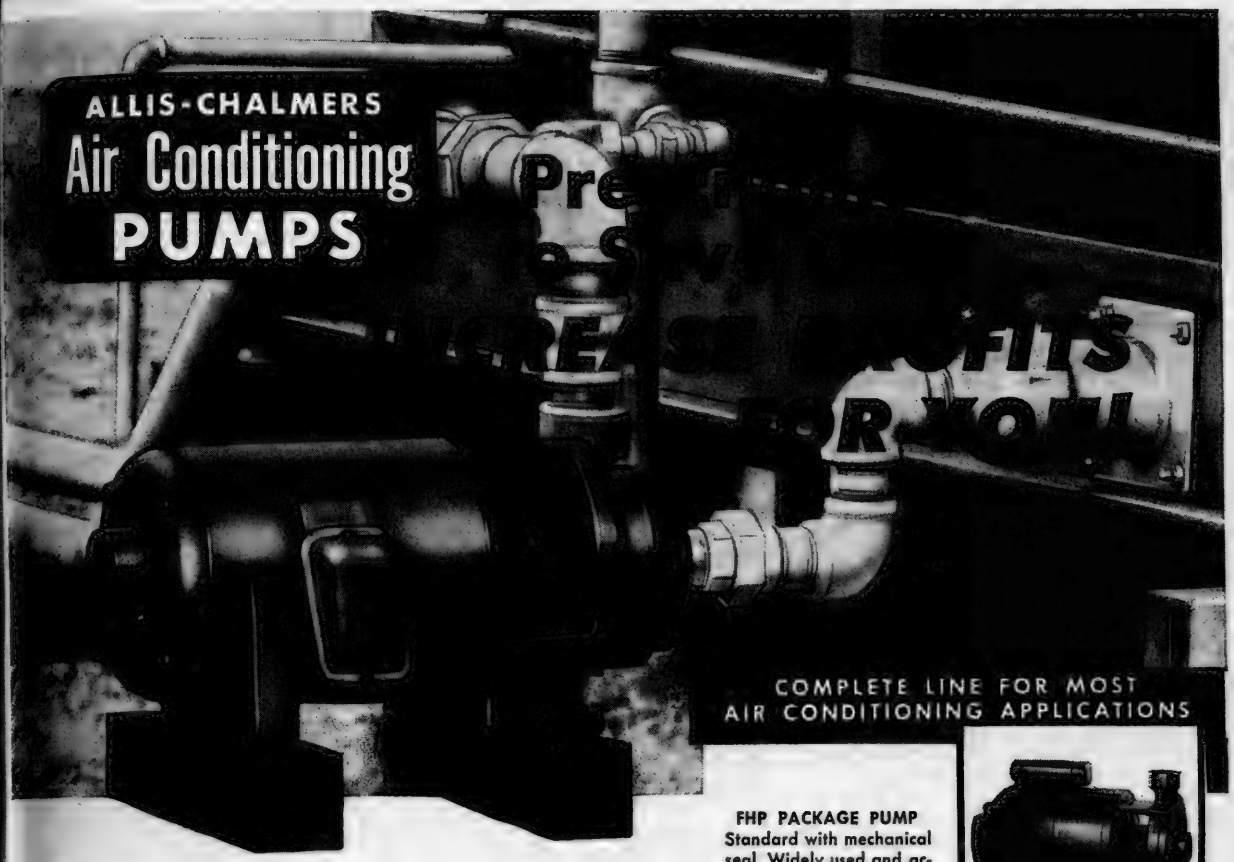
Engineering Firm: Winfield S. Bondy

THE STURDY, HANDSOME NATIONAL PIPE porch railings carry out the modern motif of the three-story structures. These different-level buildings are cleverly disposed on a hilly site to make the most of the relation of the various blocks to green areas.

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S NATIONAL Steel PIPE

UNITED STATES STEEL



Pre-engineering of your air conditioning installation by Allis-Chalmers means a more profitable installation for you. You are relieved of much expensive and time-consuming application engineering work . . . and you are sure that you are getting the right pump for your needs.

Allis-Chalmers engineers have wide experience in applying air conditioning pumps. Because they have a complete range of types and sizes to choose from, they can help you select the exact pump you need for dependable performance at lowest possible cost. Allis-Chalmers engineers can often suggest changes in your installation that will make it simpler and more satisfactory. And, when you use Allis-Chalmers equipment, you have *one reliable guarantee* for the complete pump and motor unit.

SAVE ON INSTALLATION TIME, TOO

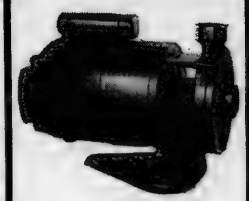
Bolt it down, hook up the power, ground and piping, and your Allis-Chalmers pump is ready to go. There's no alignment problem. Correct installation is a big factor in pump performance and your Allis-Chalmers representative will help you here, too.

For Application Help, call your nearby Allis-Chalmers District Office. For more information about Allis-Chalmers air conditioning pumps, write for bulletins 52B7529, 52B6140, 52B6083 or 52B6975. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4327

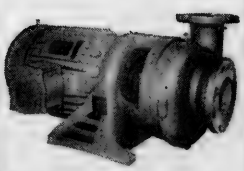
Electrifugal is an Allis-Chalmers trademark.

FHP PACKAGE PUMP
Standard with mechanical seal. Widely used and accepted for air conditioning and refrigeration.
BULLETIN 52B7529



***ELECTRIFUGAL* PUMP**
A close-coupled pump with either conventional packing or mechanical seal.
BULLETIN 52B6140

SUPPORTING ADAPTER PUMP
Flange motor and pump on sturdy supporting adapter. With conventional packing or mechanical seal. BULLETIN 52B6083



VERTICAL MOUNTED PUMP
Mechanical seal or sealless units with choice of submerged or sidewall mounting. BULLETIN 52B6975

ALLIS-CHALMERS

G-E Packaged Units Give Low-cost Air Conditioning in AAA Building

What's the best way to air condition the large building that was never designed for it?

Flexible new General Electric Packaged Air Conditioners provide the answer for A.A.A.'s newly remodeled building in Washington, D.C. Just three G-E units on each floor cool this 30-year-old building. 5, 7½ and 10 horsepower models are used—depending on the space each handles—representing 180 tons in all.

Here's why G-E Packaged Units were selected and why more and more buildings of all kinds are being cooled in this way.

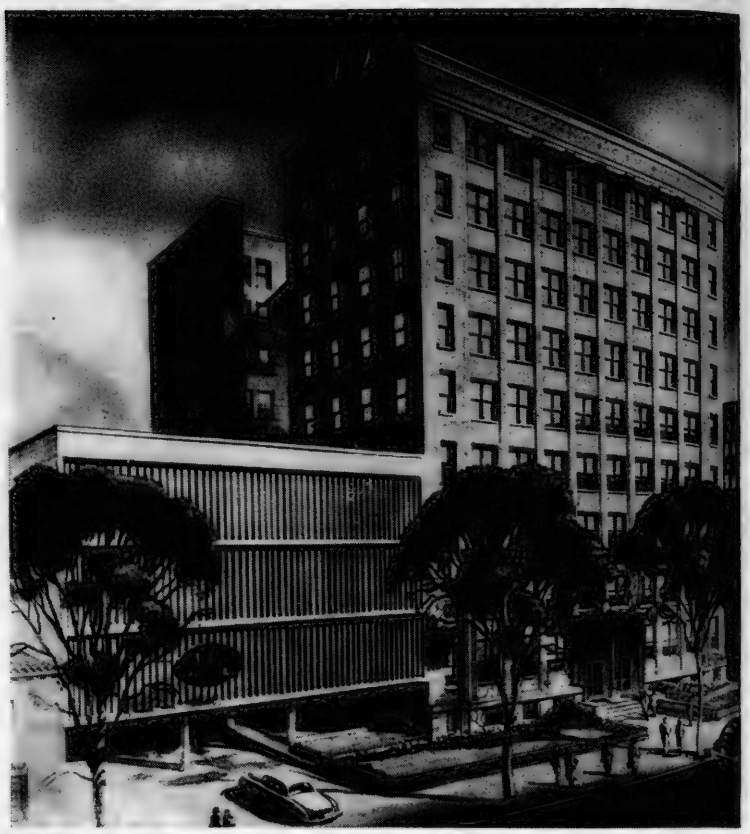
LOW FIRST COST. Equipment is priced surprisingly low. Installation costs are low, too, for remodeling can be held to a minimum. Duct runs are shorter than would be required for a central system. In many applications they are not required at all. No machinery rooms, either.

FIT EVERY APPLICATION. The adaptability of G-E units is unmatched. 3 different sizes were used in the AAA Building, and G.E. makes even more—enough to fit any situation, in-space or out-of-space. They take little floor-space, can be squeezed into corridors and little-used areas.

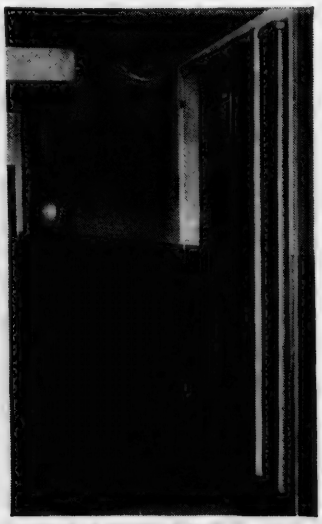
PARTIAL OPERATION. Zoning is simplified. When only part of a building is in use, units in other areas can be shut off, saving money.

G-E 5-YEAR WARRANTY is another advantage over central systems. G.E.'s sealed-in-steel cooling unit is so trouble-free that G.E. provides 5 years' protection (including labor) on the entire refrigeration cycle. Don't forget, with G-E no expensive maintenance crews are needed.

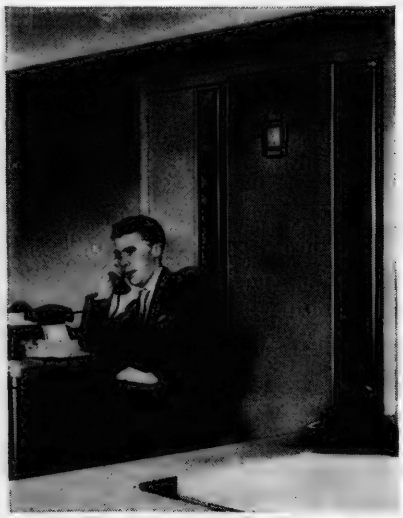
To find out how you can use G-E Packaged Air Conditioners profitably, write General Electric Company, Sec. HV-4, Air Conditioning Division, Bloomfield, N. J.



NEWLY REMODELED American Automobile Association Building in Washington, D. C., is air conditioned by 3 G-E Packaged units on each floor. Architect for remodeling was A. R. Clas; George H. Riggs, Jr., associate. Consulting engineers: Lanier & Levy. General contractor: Wm. P. Lipscomb Co. Mechanical contractor: Morris and Eagan Co.



RECESSED IN CORRIDOR WALL, this 7½-ton G-E unit sends conditioned air to surrounding offices. Air returns through louvers in doors to unit.



IN-SPACE APPLICATION of 5-ton G-E unit. It air conditions large membership room in which it is located plus other offices. Note streamlined vertical air inlets.

FOR BIG DRAFTING ROOM and other areas, G-E 10-ton unit provides quiet, steady cooling. Individual units like this can be turned off when not needed—others can be left on.

Packaged

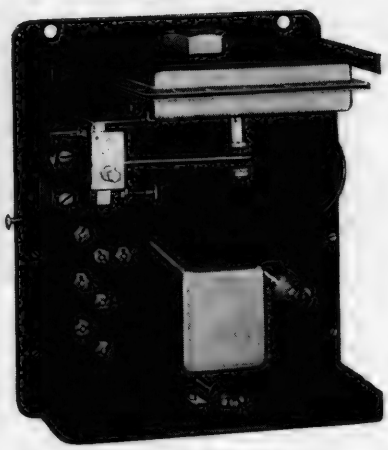
AIR CONDITIONERS

GENERAL ELECTRIC

NOW COMPLETE PROTECTION when DRAFT FAILS

CLEVELAND LO-DRAFT CUT-OFF

CLOSED VIEW



OPEN VIEW

Three models available—for 115V or 230V control circuit:

LD-A—LO-DRAFT Switch only.

LDT-A—Control with Time-delay for interrupting low-voltage burner control circuit.

LDR-A—Control with Time-delay for interrupting line voltage burner control circuit.

All models can be supplied to operate from wind-box pressure.

—the only "FAIL-SAFE" draft switch with TIME-DELAY FEATURE

This safety device is engineered specifically to prevent explosions or damage to boiler by automatically cutting off burner when draft fails, whether induced or natural. Only *Cleveland* LO-DRAFT CUT-OFF has all these features:

1. Sensitive enough to work from overfire draft for remote installation. Can also be installed at the breeching.
2. Cut-off point adjustable on the job—over complete range.
3. Time delay prevents momentary puffs from cutting off burner.
4. Standard unit interrupts low-voltage burner control circuit. Simple plug-in relay adapts unit for line voltage interruption.
5. Flexible diaphragm—laboratory tested to 100,000 operations without failure.
6. Signal light indicates momentary or sustained low draft.
7. Terminals provided for alarm or remote signal.
8. Hermetically sealed, plug-in time delay relay, self-compensating for ambient temperature.
9. Extra-sensitive, sealed switch with positive on-off action.
10. Absolutely *fail safe.* Failure of any component immediately cuts off burner.

LO-DRAFT CUT-OFF OPERATION

CONDITION	SIGNAL	DRAFT GAGE	INDUCED DRAFT FAN	BURNER
SAFE DRAFT	OFF		ON	ON
BURNER PUFF (Momentary Low Draft)	on intermittently		ON	ON
DRAFT FAILURE	ON		OFF	OFF

Write for complete information.

The CFE line includes damper controls, steam controls, electronic smoke detector control units, draft, air pressure and flue temperature gages.

See our Exhibit at Booth 712, Oil-Heat Show, Philadelphia, May 16—20

COMBUSTION CONTROLS — Cleveland Fuel Equipment Co.

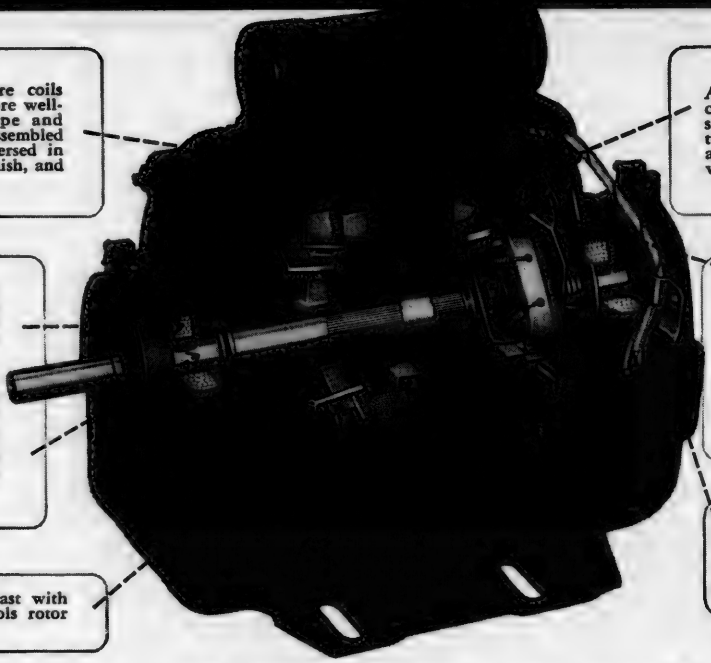
CLEVELAND *Fuel Equipment* **COMPANY**

1111 BROOKPARK RD., CLEVELAND 9, OHIO

Wagner®
ELECTRIC MOTORS
... the choice of leaders in industry

for a Capacitor-Start Motor worthy of your product...

choose the Wagner Type RK



Formvar-covered wire coils are prewound to assure well-balanced rigid shape and accurate fit in slots. Assembled stator is dried, immersed in heavy insulating varnish, and baked.

Long strand wool yarn furnishes a constant supply of filtered oil to the bearing.

Tin babbitt-lined bearings stand heavy pressures with low temperature rise, have excellent anti-seizure properties and are corrosion resistant.

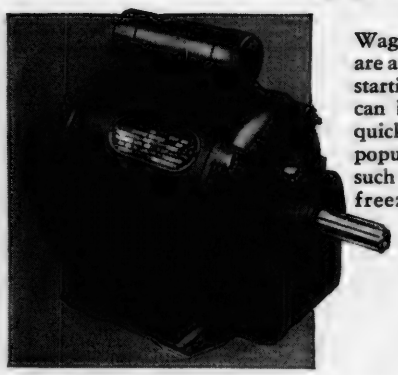
Blower, integrally cast with rotor, effectively cools rotor and stator.

Aluminum squirrel-cage rotor, cast under heavy pressure, is simple and sturdy in construction and is dynamically balanced to insure freedom from vibration.

Here's the exclusive Wagner quick-break switch that disconnects the starting winding and capacitor from the line when the motor approaches operating speed. It will operate well over a million times without trouble.

Built-in thermal protection for motors of 1 hp and less.

Type RK fits your needs for applications requiring high starting torque



Wagner capacitor-start induction motors are a sound choice for applications where starting loads are fairly heavy, but which can be brought up to operating speed quickly. They have become increasingly popular for installation on equipment such as air conditioners, refrigerators, freezers, water pumps, motor-driven tools, and on similar fractional or integral horsepower applications.

These motors offer low maintenance cost—only a minimum of servicing is required—and they give many years of reliable service with unusual freedom from vibration and noise.

* * *

When you standardize on Wagner Motors—you get the advantages of a liberal warranty... of nationwide service facilities, with on-the-spot service, replacement motors and parts available from 25 Wagner-owned Service Branches and more than 750 Authorized Service Stations. You can choose from a wide variety of types and sizes—single-phase or polyphase—(from 1/125 to 400 hp). Bulletin MU-185 gives complete information—write for your copy.

Wagner Electric Corporation
EST. 1891

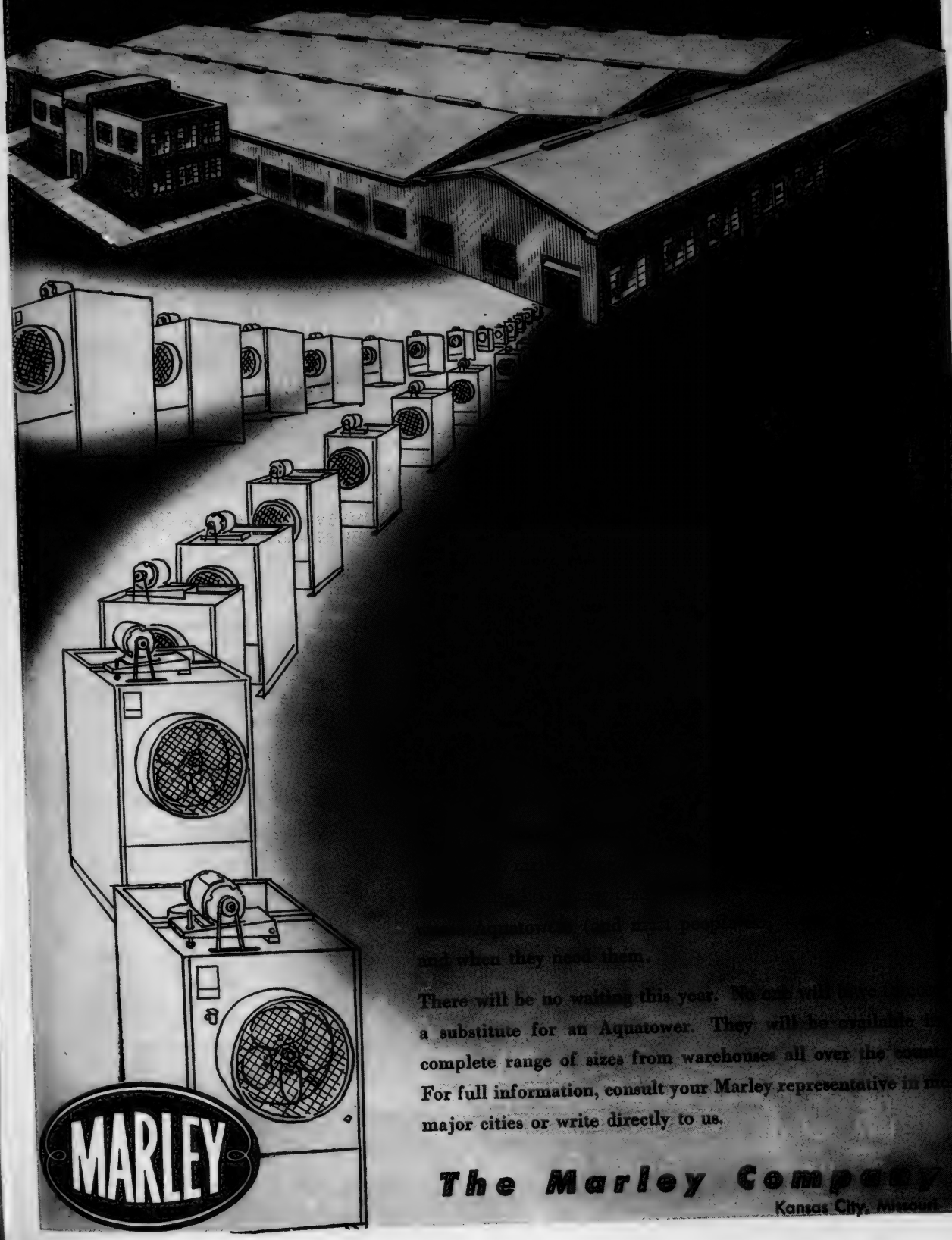
WAGNER ELECTRIC CORPORATION
6463 PLYMOUTH AVE., ST. LOUIS 14, MO., U.S.A.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

ELECTRIC MOTORS
TRANSFORMERS
INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

M54-4

New MARLEY PLANT



and when they need them.

There will be no waiting this year. No one will have to accept a substitute for an Aquatower. They will be available in the complete range of sizes from warehouses all over the country. For full information, consult your Marley representative in most major cities or write directly to us.

The Marley Company

Kansas City, Missouri

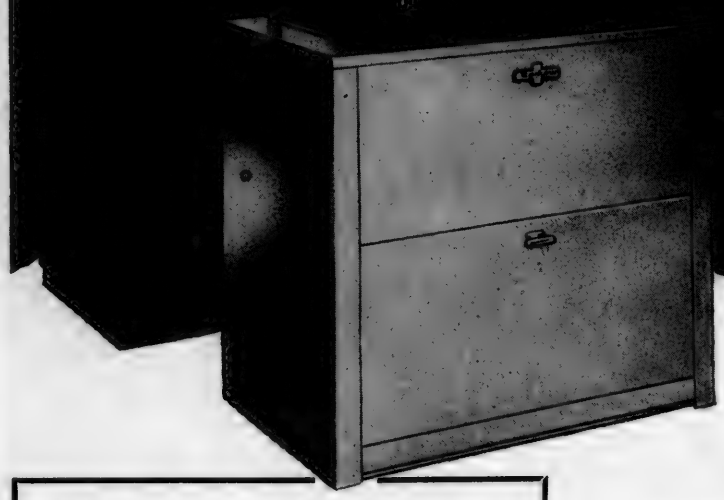
NEW-RESIDENTIAL AIR CONDITIONER

Barkow

weatherwise

FU UNIT

designed to fit furnace blower capacity!



Check these Barkow features:

- EXCEED RATED CAPACITY
  Ex. the FU-2 (2-ton unit) produces 28,000 Btu—4,000 over its required output
- COMPLETE PACKAGED UNIT—SHIPPED ASSEMBLED
- COMPACT—Occupies only 6 sq. ft. of floor space
- WASHABLE FILTER SCREENS
- ALL PARTS ACCESSIBLE FROM FRONT PANEL
- FULL HERMETIC COMPRESSOR, CAPILLARY SYSTEM, F-22 FREON
- ALUMINUM FIN EVAPORATOR, Copper tube with capillary tube
- COUNTERFLOW CLEANABLE TYPE CONDENSOR
- THERMOSTATIC CONTROL — High Pressure cut out, thermal overload and low voltage motor protection.

Lightweight, Economical, Easy to Install . . . It's the unit that makes year 'round home air conditioning a practical and economical reality! And it's a complete packaged unit, shipped assembled, ready for fast, easy installation.

The improved FU coil design reduces face velocity preventing coil icing and plugging. Its increased cooling efficiency, thus obtained, makes the FU adaptable to any size warm-air furnace without any of the usual costly changes.

Dealers prefer the FU's simplicity . . .
Owners praise its efficiency and its economy!

Write for Complete Details • VALUABLE EXCLUSIVE TERRITORIES AVAILABLE

refrigeration division

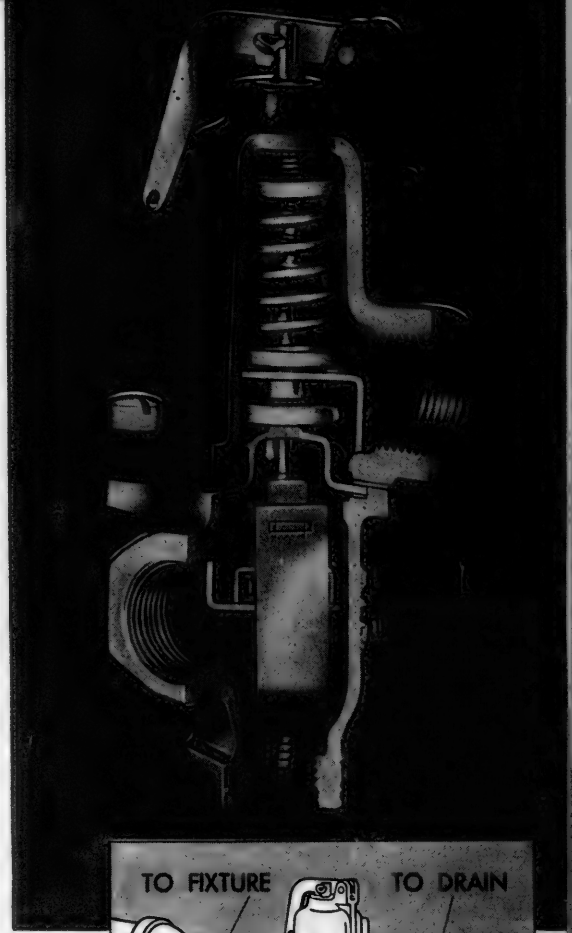
Aug. G. Barkow Mfg. Co., Inc.

2230 South 43rd Street Milwaukee 15, Wisconsin

Ready...

McDONNELL 202 SERIES T & P VALVE

Steam Rated on Pressure Side
Fully Automatic Reseating



HERE is the product so many contractors have been asking for. It's the new McDonnell 202 Series T & P Valve . . . or should we call it new? Actually it is new only in the sense that it brings together for the first time two fully tested, highly respected McDonnell relief valves. You can be sure that the 202 is the "happy combination" you've been needing because it combines two valves you know to be the best of their types!

Two fully-tested valves in one . . .

Yes, for pressure relief the 202 Series utilizes the operating mechanism of the McDonnell 230 series. This means that the pressure relief capacities (listed below) are *steam rated* in Btu's./per hr. in accordance with accepted procedure — the only way to match discharge capacity of a pressure relief valve to the Btu. output of a heater, thus precluding over-pressure under any and all emergency conditions. In fact, the 202 is the *only* T & P valve in which the pressure side is steam rated!

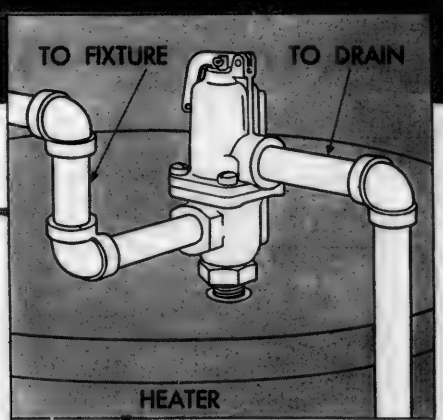
And for temperature relief the No. 202 embodies the operating mechanism of the No. 201 temperature relief valve . . . which means accurate response to temperature; powerful and positive opening; drip-tight reseating when temperature is under control. It means all this because the mechanism has the Vernatherm element which starts to open at precisely 188°F.; opens up to full capacity in a twenty degree rise; reseats tightly when temperature drops to 183°F.

Also because the 202 series contains the 201 unit, it has the ¾" tapping for piping to fixtures which directs the service flow water through the body of the valve as diagrammed opposite. This is a real innovation. It cuts installation costs; it eliminates any air in the valve chamber; and, still more important, it keeps the temperature element subjected to service-water temperature, assuring control of the water temperature *as used*.

A new bulletin tells the whole story of the 202 series. Ask for it.

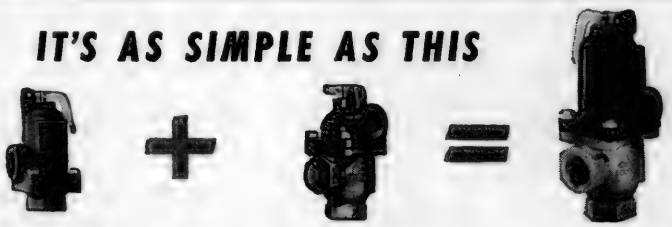
McDonnell & Miller, Inc., 3500 N. Spaulding Ave., Chicago 18, Ill.

Doing One Thing Well



Note fixture tapping for taking service water through the body of the valve.

IT'S AS SIMPLE AS THIS



No. 230 Pressure Relief Valve	No. 201 Temperature Relief Valve	No. 202 T & P Relief Valve

You know what the 230 and 201 represent individually; so you know what they can do together in the 202!

Pressure relief capacities of the 202 series based on *steam discharge are:*

T & P Valve number	Opening pressure	Capacity Btu./hr.
202 - 75	75 lbs.	410,000
202 - 100	100 lbs.	527,000
202 - 125	125 lbs.	644,000

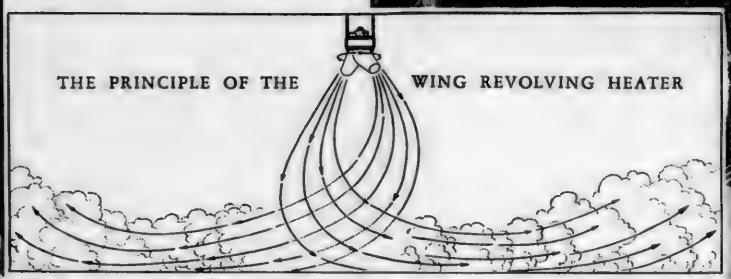
Temperature relief capacity of all No. 202 series T & P valves, based on hot water discharge, is 725,000 Btu./hr. (A G A tested and rated) Operating range of heating element: 188° — 208°F.

Your Jobber Stocks Them

McDONNELL

HEAT THAT MOVES AROUND

THE fact that the discharge outlets of WING Revolving Unit Heaters keep the heated air in constant, gentle motion is one of the reasons why nationally known firms like the Budd Company have installed them in their plants, both at Philadelphia and in the one shown in this photograph, at Gary, Indiana. The big blanking and forming presses in this great plant present a natural barrier to ordinary fixed discharge heating systems, but not to the moving streams of heated air from the WING Revolving Heaters, even suspended, as they must be, far above the floor, to clear the cranes. That is equally true in the summer time when, with steam turned off, the cooling breezes from the revolving discharge outlets keep workers comfortable on the hottest days. Investigate. Write for Bulletin HR-6.



The moving streams of heated air (or cooling breezes in summer) sweep slowly around through 360 degrees, covering successively every direction. The air velocity is sufficient to carry to walls, and remote corners and the constantly changing direction of flow causes the air to find its way around obstructions.

Wing

L. J. Wing Mfg. Co.
158 Vreeland Mills Road
Linden, New Jersey
Factories: Linden, N. J. and Montreal, Can.
In Europe: Etab. WANSON, Brussels, Belgium

MOTORIZED CHIMNEY DRAFT

with the WING DRAFT INDUCER

No boiler can operate satisfactorily or efficiently over wide ranges of weather or load with variable natural draft. The fuel—whether oil, gas or coal—must have enough oxygen for complete combustion. There must be sufficient draft or furnace fires will be slow burning and lifeless, resulting in uneven, insufficient and irregular heat.

WING Draft Inducers insure positive, adequate, uniform draft regardless of variable weather conditions or inadequate chimney or breeching construction.

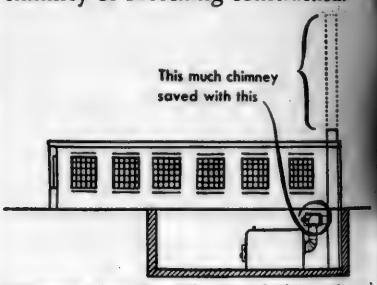


Diagram above shows how much chimney is saved by installing Wing Draft Inducers.

Wing Draft Inducers are suitable for use in connection with oil, gas, stoker-fired or hand-fired heating boilers, industrial furnaces or kilns, or high pressure steam boilers, either stationary or marine. Sizes are available for boilers as low as 1000 sq. ft. E. D. R. up to steam generators producing 100,000 pounds of steam/hr. Special, heavy duty designs available for these larger boilers.

Wing Draft Inducers are made in two types—for insertion in breeching or flue, or for installation on top of a chimney. Write for a copy of Bulletin I-52 to L. J. Wing Mfg. Co., 158 Vreeland Mills Road, Linden, New Jersey.

Remember the trade marks "tt" and "TUBE-TURN" are applicable only to products of TUBE TURNS.

Engineered for endurance

THE TUBE-TURN Welding Neck Flange is the preferred choice for most severe piping services—resulting from high pressures, temperature extremes, or numerous fluctuations of substantial amount in either temperature or pressure or both. Due to its long-tapered hub which affords a smooth transition in thickness, the welding neck flange assembly has an endurance strength equal to that of pipe joined by butt welds.

You can fill all your requirements for Welding Fittings and Flanges from TUBE TURNS' complete line. For prompt, efficient service, call your nearby TUBE TURNS' Distributor. You'll find one in every principal city.

The Leading Manufacturer of Welded Fittings and Flanges

TUBE TURNS LOUISVILLE 1, KENTUCKY

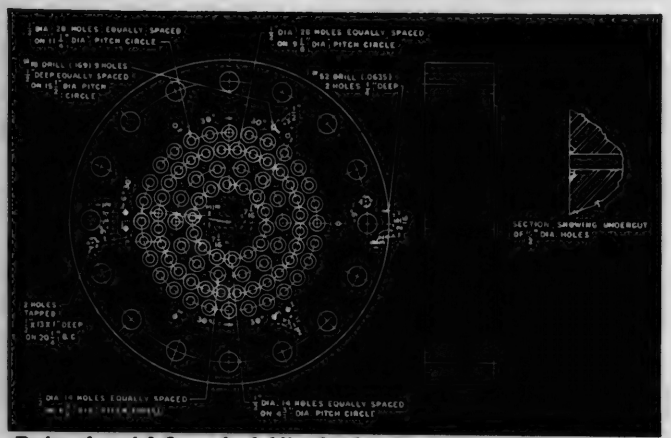
A Division of National Cylinder Gas Company

DISTRICT OFFICES: New York • Philadelphia • Pittsburgh • Cleveland • Chicago • Denver • Los Angeles
San Francisco • Seattle • Atlanta • Tulsa • Houston • Dallas • Midland, Texas

YOUR NEEDS *in welding fittings and flanges are met efficiently and quickly by your nearby* TUBE TURNS' *Distributor. There are more than 4000 items in the complete line of* TUBE TURNS' *products. Example: carbon steel elbows from ½" to 42" diameter as shown.*

SIMPLIFIES JOB. *The uniform wall thickness and true circularity of* TUBE-TURN *Welding Elbows makes possible accurate fit-up when cut to odd angles for jobs such as the 16" gas line shown.*

Your problems solved by TUBE TURNS' ENGINEERING SERVICE



Design of special flange for holding heating elements.

MOST FLANGE NEEDS in industrial piping are filled by TUBE TURNS' ASA line of various types, sizes and materials. However, there are many exceptions . . ."specials" such as these: (1) lens ring flanges for use at 5300 psig and 400°F, with test pressure of 10,600 psig; (2) flanges in sizes from 14" through 72" for use at 30 psig and 400°F max.; (3) 2" flanges for high vacuum service at 400°F—950°F, and (4) various complex sheet tube flanges.

A "special" example is shown at the left, developed by TUBE TURNS' Engineering Service Division for E. L. Wiegand Co., Pittsburgh. It has 84 holes for heating elements. Flanges must withstand hydrogen-nitrogen mixture at 1000 psig at 750°F and 3000 psig at atmospheric temperature.

TUBE TURNS IS AT YOUR SERVICE!

TUBE TURNS, Dept. B-2
224 East Broadway, Louisville 1, Kentucky

Company name _____

Company address _____

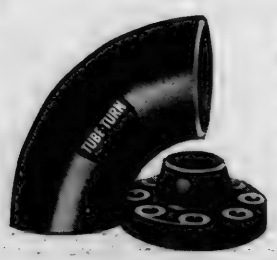
City _____ *Zone* ____ *State* _____

Your Name _____

Position _____

DISTRICT OFFICES

New York	Midland
Philadelphia	Tulsa
Pittsburgh	San Francisco
Cleveland	Los Angeles
Chicago	Seattle
Houston	Atlanta
Dallas	Denver



"TUBE-TURN" and "TUBE-TURN" Reg. U. S. Pat. Off.

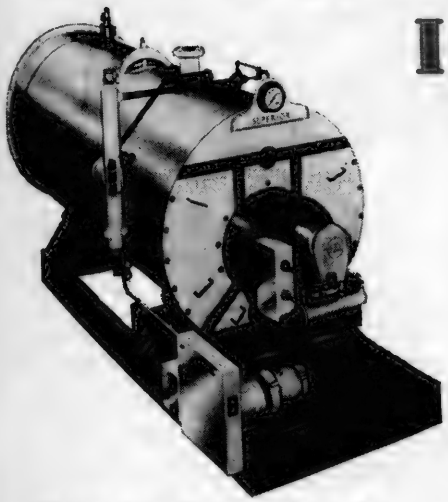
TUBE TURNS

LOUISVILLE 1, KENTUCKY

A DIVISION OF NATIONAL CYLINDER GAS COMPANY

Completely "Packaged" Superior Steam Generators on factory test line.

only a TRUE PACKAGED boiler IS TESTED like this.



18 sizes from 20 to 600 b.h.p. for pressures to 250 p.s.i. or for hot water. For complete details write for Catalog 619.

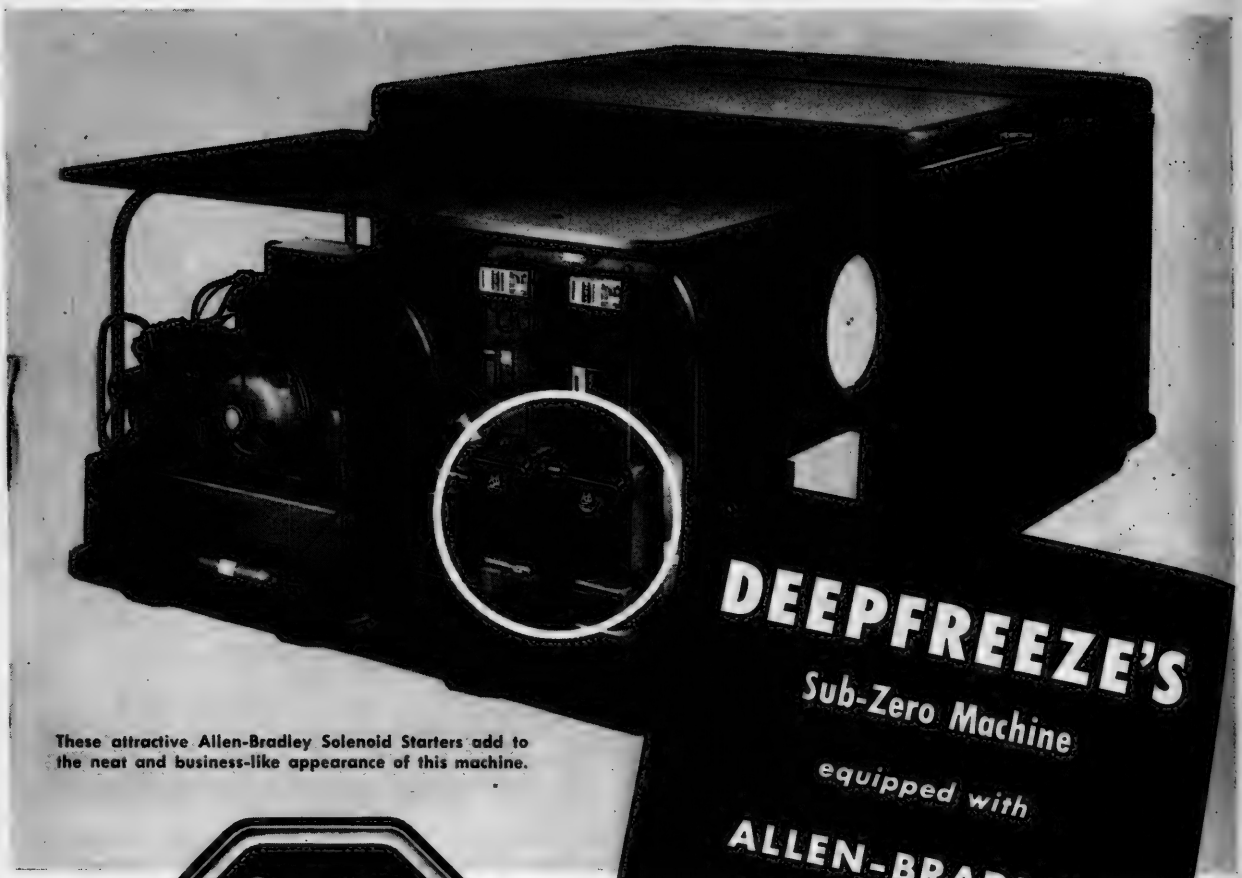
At the Superior factory in Emmaus, Pa., every steam generator is thoroughly tested before shipment. This is one of the outstanding advantages of the *true* packaged steam generator. Completely assembled at the factory with burner and all boiler trim installed, it is set on a testing line, connected to service supplies, and fired. During this test firing period, trained technicians thoroughly check on all points of performance and make whatever adjustments are necessary to bring the unit into top operating condition.

Then, and then only, is a Superior Steam Generator shipped . . . with a written guarantee based on the results of this actual test firing. There's no guesswork about Superior Steam Generators. Every guarantee is based on the actual performance of the unit to which it applies.

for performance you can **BANK** *on*

SUPERIOR COMBUSTION INDUSTRIES INC.
TIMES TOWER, TIMES SQUARE, NEW YORK 36, N.Y.

SUPERIOR
STEAM GENERATORS



These attractive Allen-Bradley Solenoid Starters add to the neat and business-like appearance of this machine.

DEEPFREEZE'S
Sub-Zero Machine
equipped with
ALLEN-BRADLEY TROUBLE FREE MOTOR CONTROLS

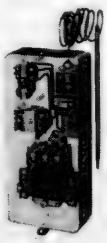
A-B Quality

A-B Bulletin 709 Solenoid Starter

Size 1 Starter with cover removed. See how simple it is! The white interiors of Allen-Bradley enclosed apparatus make installation easy in dark places.

A-B Special Air-conditioning Control Unit

Consists of Bulletin 709 Solenoid Starter, Bulletin 836 high pressure cutout, Bulletin 837 thermostat with adjustable knob, and Bulletin 600 manual switch, for fan operation.



Why are Allen-Bradley starters so popular for refrigeration and air-conditioning service? . . . because experience has proven them to be trouble free. Only ONE moving part. No pivots, pins, or bearings to corrode or stick . . . no jumpers to break. You install them . . . and forget them!

No contact maintenance . . . Allen-Bradley silver alloy contacts never need cleaning, filing, or dressing. They are always in perfect operating condition.

Dependable overload relays . . . Allen-Bradley "solder pot" relays are accurate and always dependable . . . even after long service.

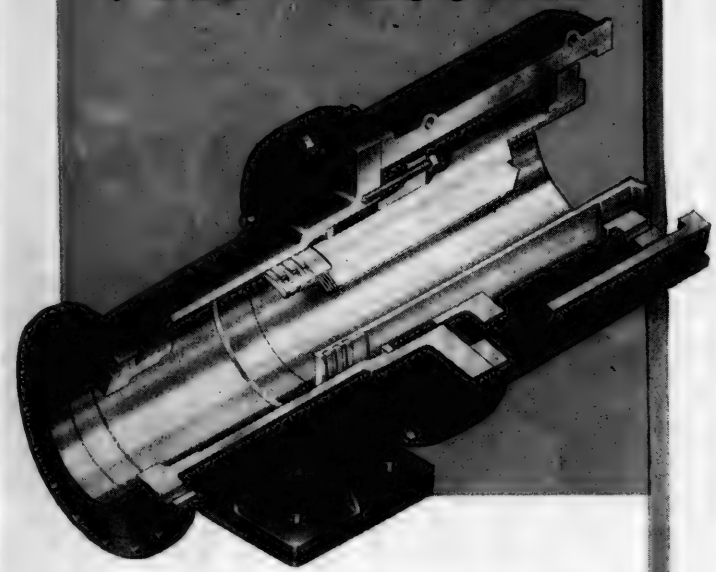
The Allen-Bradley trademark stands for "Quality" in electric motor control.

Allen-Bradley Co., 1330 S. Second St., Milwaukee 4, Wis.

ALLEN-BRADLEY SOLENOID MOTOR CONTROLS

ADSCO EXPANSION JOINTS...

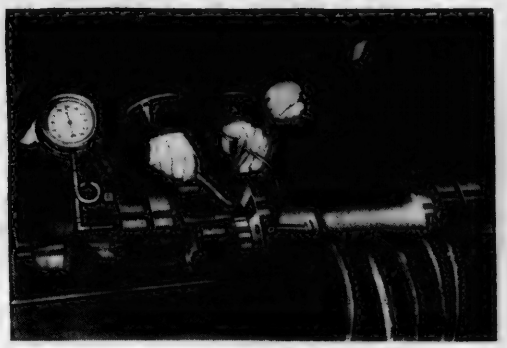
UNPACKED AT FULL PRESSURE



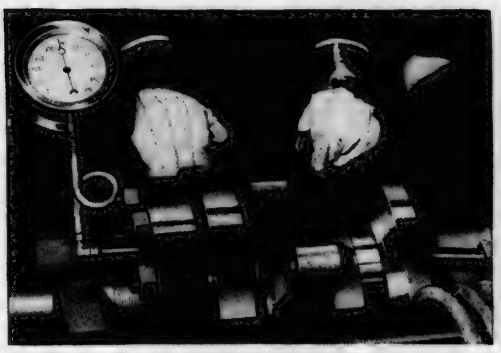
▶ ADSCO piston-ring expansion joints can be serviced . . . in fact, unpacked and repacked . . . under full line pressure. There is no interruption of service, no down-time for repacking, because the job is done under normal working conditions.

▶ Yet this isn't the only great feature of this high-quality joint. Slip is completely guided . . . split external guide permits smaller manholes . . . limit stops prevent over-travel of slip . . . polished surface cannot be scored because slip is in contact with packing only . . . misalignment is prevented by both internal and external guiding. ADSCO piston-ring expansion joints are available in a full range of sizes, with 4", 8", or 12" traverse per slip, for pressures to 400 psi and greater and for temperatures to 800F and higher. Call an ADSCO representative or write for Bulletin 35-15H.

. . . and here's proof



Last strand of packing being withdrawn from stuffing box.



Close-up photograph shows all packing removed. With steam at 240 lbs. pressure and with 300° superheat there is no trace of steam in the empty stuffing box.

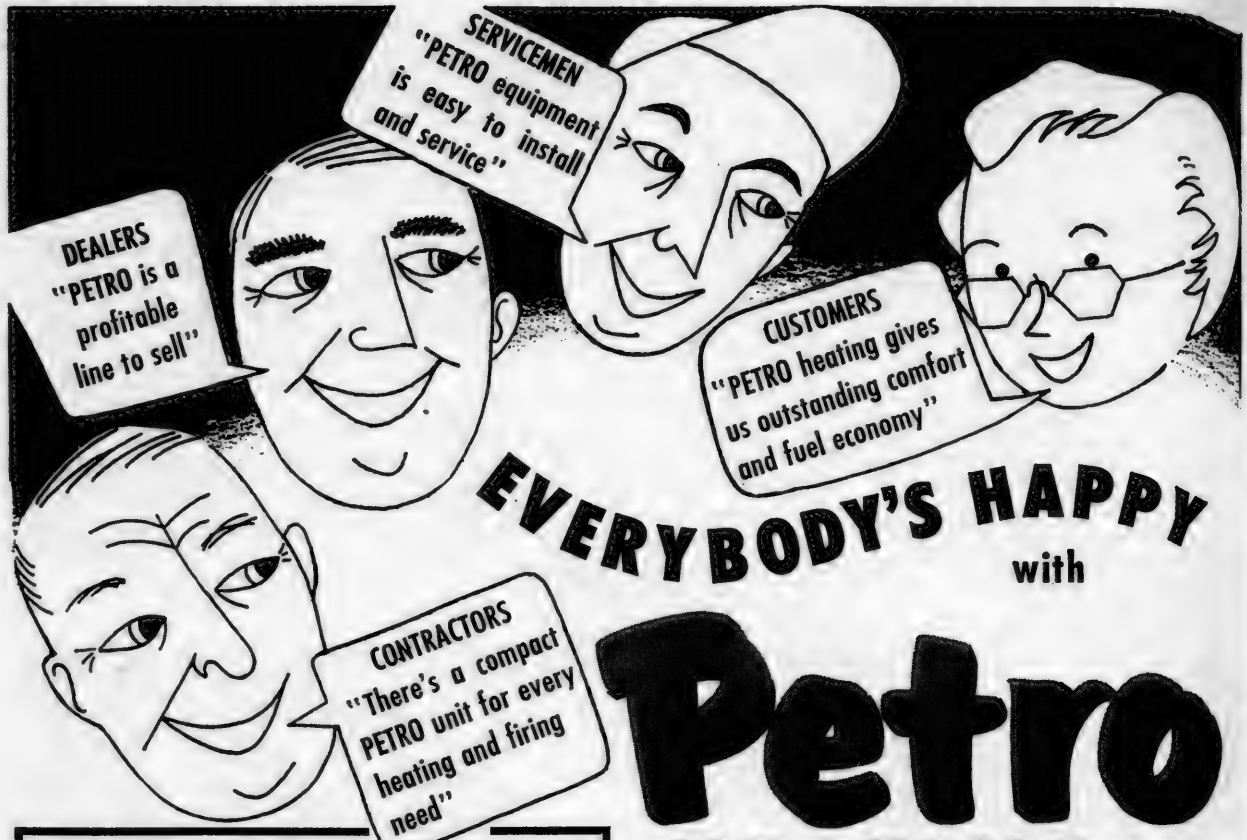
With periodic adjustments of the gland, it may never be necessary to repack the stuffing box in an ADSCO piston-ring expansion joint. However, lack of maintenance may make it necessary at some time to do so and the job is easy with this ADSCO joint. The piston rings hold the line pressure during the unpacking and repacking operation. With the vent valve open, the vent chamber is at atmospheric pressure and, under this condition, no steam can enter the stuffing box space. Thus complete repacking can be done under full line pressure.

ADSCO ENGINEERED PRODUCTS

EXPANSION JOINTS
HEAT EXCHANGERS
STEAM TRAPS
STRAINERS
SEPARATORS
METERS

AMERICAN DISTRICT STEAM COMPANY, INC.

GENERAL OFFICES
NORTH TONAWANDA, NEW YORK
PLANTS: NORTH TONAWANDA, N. Y., AND RICHMOND, CALIF.


SERVICEMEN
"PETRO equipment is easy to install and service"
DEALERS
"PETRO is a profitable line to sell"
CUSTOMERS
"PETRO heating gives us outstanding comfort and fuel economy"
CONTRACTORS
"There's a compact PETRO unit for every heating and firing need"

EVERYBODY'S HAPPY with Petro HEATING

IT'S A FACT—Petro heating equipment is built to *satisfy!* Contractors and dealers appreciate the complete line from which to choose; they appreciate the "customer confidence" that has been built-up over the past 51 years. Service men like the compactness, simplicity, and easy access to connections and working parts which Petro equipment offers. Customers are enthusiastic about Petro's outstanding performance, low fuel costs, and long trouble-free service.

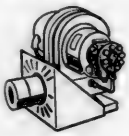
YES, everybody's happy with Petro heating. It is profitable to install—easy to service—economical to own. Write today for complete information.

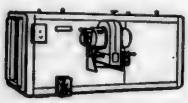
RESIDENTIAL OIL AND GAS FURNACES

Complete winter air conditioners made in popular sizes to fit the heating needs of homes from 4 to 10 rooms. Extremely compact and attractive. Real fuel-savers. Both Highboy and Lowboy models available. Lowboy shown above.

CONVERSION BURNERS OIL OR GAS

Efficient units for converting your present furnace or boiler to automatic heat. Low in cost and real fuel savers. (Oil unit shown.)



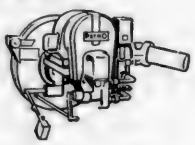


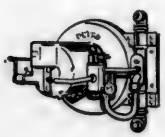
HORIZONTAL OIL FURNACE

Hang it or hide it—this winter air conditioner fits anywhere. Available in 5 models from 80,000 to 180,000 Btu's (output at bonnet).

INDUSTRIAL OIL BURNERS

Horizontal Rotary cup type oil burners for cold, heated, or tempered oils. Capacities up to 200 gallons per hour.





COMBINATION OIL-GAS BURNERS

This commercial industrial burner is the answer to seasonal fuel shortages. Makes possible advantages in economical fuel buying.

Send for free catalog

Write PETRO, 3049 West 106th Street, Cleveland 11, Ohio, or in Canada: 2231 Bloor Street West, Toronto, Ontario

Residential Oil and Gas Burners, Oil and Gas Furnaces and Boilers, Industrial and Commercial Oil, Gas and Oil-Gas Combination Burners

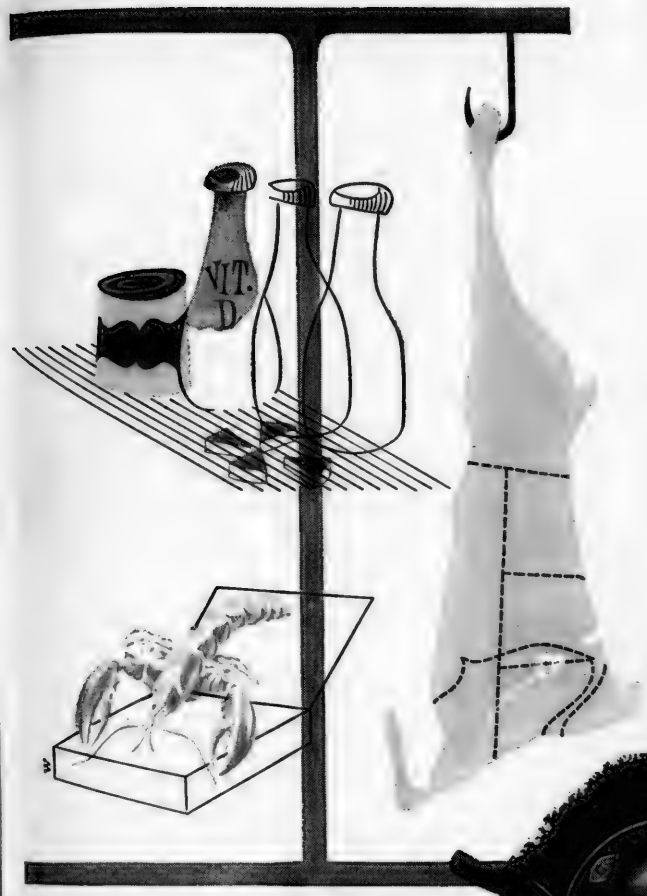
PETRO

T.M. REG. U.S. PAT. OFF.

OVER 50 YEARS OF LEADERSHIP IN AUTOMATIC HEATING AND POWER EQUIPMENT

THE MARK OF EXTRA DEPENDABLE
REFRIGERATION AND
AIR CONDITIONING EQUIPMENT

ED
ELECTRO DYNAMIC

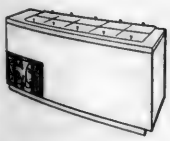


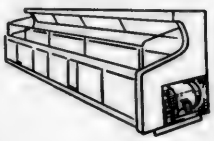
The red "power spot" on refrigeration or air conditioning equipment means *powered by Electro Dynamic,* the most dependable motors *ever* available to industry.

For *proof* of this *extra dependability* send the coupon below for your copy of **"MOTOR SHOWDOWN",** a new candid report on comparative results of motor performance tests* conducted in accordance with A.I.E.E. standards.

*Tests certified by J. Arthur Balmford, Professor of Electrical Engineering at a leading Eastern University.

1 to 250 hp., AC and DC
N.E.M.A. standard frames
All types of enclosures





ELECTRO
Extra
DYNAMIC
Dependable motors

ELECTRO DYNAMIC
Division of General Dynamics Corporation
151 Avenue A, Bayonne, New Jersey

ED MOTOR SHOWDOWN

Please send me a copy of "MOTOR SHOWDOWN" and the new catalog of Electro Dynamic industrial motors.

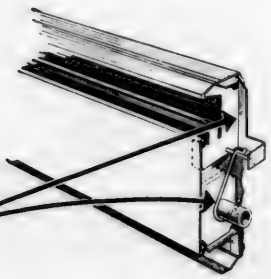
NAME_____
COMPANY_____
ADDRESS_____

Heatrim Panels by American-Standard offer you unlimited opportunities for increased sales and profits through

HEATRIM PANELS are trim, efficient, correctly designed. They offer the outstanding features of convector heating for modern homes and buildings. These panels replace regular wooden baseboards, presenting a finished appearance along any wall length.

THE NEW HANGER
ON HEATRIM PANELS

This is a specially-designed combination support bracket and hanger. It permits maximum expansion of the heating element without noise, makes installation easier. Because of this improved design, it is possible to have longer straight run assemblies at minimum installation cost.



AMERICAN-Standard
HOT WATER HEATING

the Magic of Hot Water Comfort

■ With today's overwhelming preference on the part of homeowners for clean, draft-free hot water heating, Heatrim baseboard panels offer you an exceptional product for boosting your business. For the magic of hot water comfort will attract more customers to you. And the attractive appearance and distinctive features of Heatrim panels by American-Standard will make selling quick and easy.

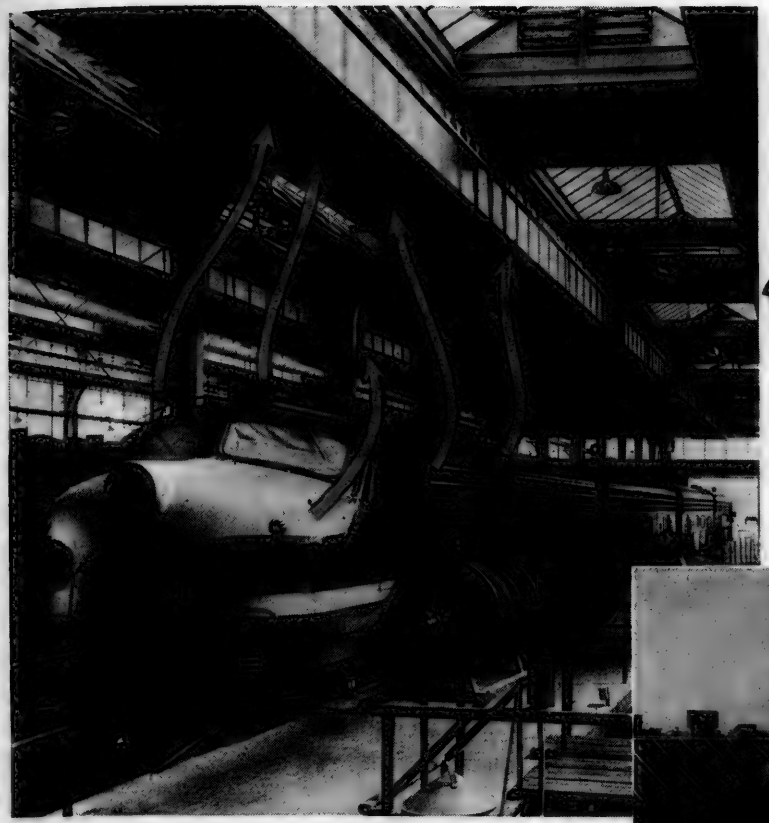
These popular-priced baseboard heating panels have been especially engineered for forced circulation hot water systems. They offer many economies in installation and operation. For example, since the heart of the element is actually a straight tube in which air is carried along with the water, air vents are not required and piping is held to a minimum. These sturdy panels are light weight and easy to handle. They reduce on-the-job costs because they come in individually-cartoned 6-foot lengths. Any needed length can thus be quickly and conveniently cut and connected.

Take advantage of the sizable market for these handsome, modern, space-saving Heatrim panels. Get in touch with your wholesaler now and order a supply to take care of your needs.

And ask your American-Standard sales office or wholesaler for a free copy of our booklet, "Selling the Magic of Hot Water Comfort"—or write to us direct. This booklet has scores of suggestions to help you sell more hot water heating equipment.

American Radiator & Standard Sanitary Corporation,
P. O. Box 1226, Pittsburgh 30, Pa.

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS



DEODORIZING DIESELS

HOW SOUTHERN PACIFIC VENTILATED ITS ROSEVILLE ROUNDHOUSE WITH JOY AXIVANE® FANS

When in need of servicing, the diesel locomotives of Southern Pacific are driven into the roundhouse and parked under long ceiling hoods. As the engines are raced or idled, the customary fumes are emitted from the exhaust. BUT, you have to sniff hard to catch even a faint whiff of diesel fumes in the roundhouse!

HOW'S IT DONE? By Joy Axivane Fans, of course. Thirty-six fans are hidden in the ceiling hoods. The exhaust gases are hustled out—at the rate of 726,000 CFM—before they can contaminate the surrounding air.

TOPS IN EFFICIENCY. Six 1½ HP models handle 11,000 CFM each, while thirty 5 HP models handle 22,000 CFM each. The fans are actually located right in the exhaust ducts—not an inch of valuable room space is sacrificed!

HIGH-TEMPERATURE PROBLEM, TOO. The air being exhausted sometimes reaches a temperature of 280° F., but temperature variations have little effect on these fans. The vaneaxial design, with adjustable blades, packs plenty of punch—under all conditions. The in-line construction and in-the-duct installation . . . possible only with this type of fan . . . make for real space savings.

136 MODELS. The Joy Axivane Fan line is a wide one. Capacities range up to 200,000 CFM and pressures top 11" wg. Some models will nestle in the palm of your hand while others would dwarf your home. Want the whole story? Write for our Bulletin J-611, TODAY. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.,*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Consult a Joy Engineer, or WRITE FOR THIS BOOKLET #J-611

W&D 1-4875

JOY

SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

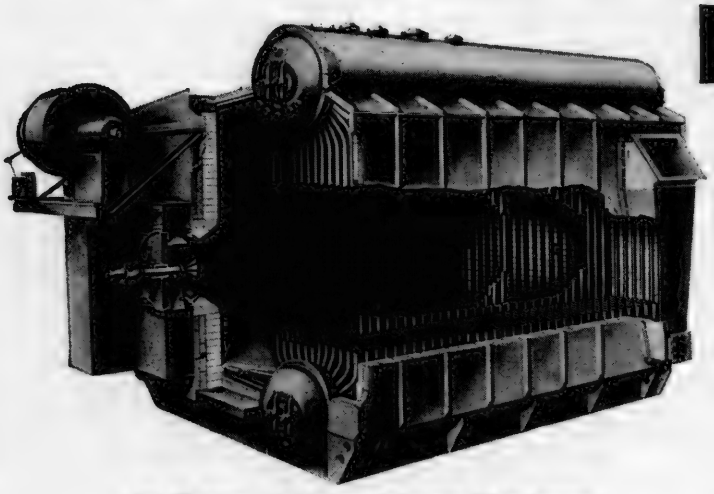
FOR STEAM CAPACITY up to 60,000 POUNDS

Choose your boiler from these two

If you burn oil or gas, investigate the VP Package Boiler for capacities up to 30,000 pounds per hr . . . the VU-10 up to 60,000 pounds.

For stoker firing, the VU-10 is available from 10,000 to 60,000 pounds of steam per hour.

Whatever your fuel . . . whatever your steam capacity requirements up to 60,000 pounds per hour — you'll find that one of the Combustion Engineering Boilers described below will be just right for you.



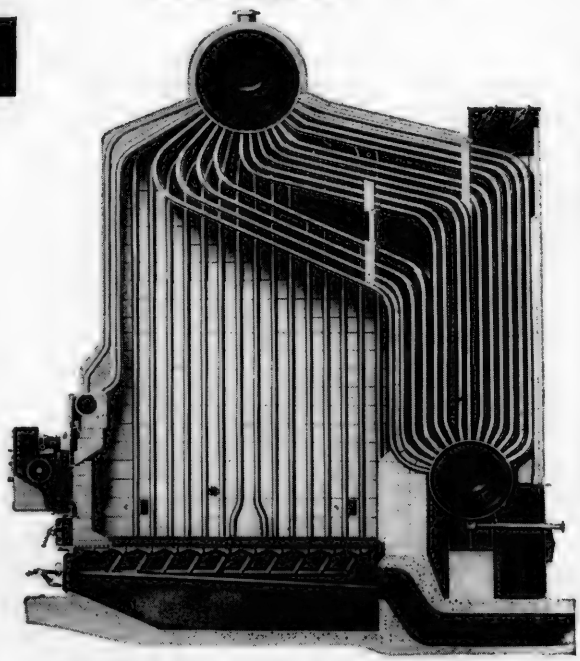
The VP Boiler — the Package Boiler with EXTRA Features

THE VP BOILER

The C-E Package Boiler, type VP . . . completely shop-assembled . . . for oil or gas firing. It is available in capacities from 4,000 to 30,000 lb steam per hr; for pressures to 250 psi. The VP Boiler has more water-cooled area per cubic foot of furnace volume than any other boiler of its size and type. The large (30-in. diameter) lower drum permits a simple, symmetrical tube arrangement . . . greater water storage capacity . . . easy access for washing down or inspection. The centrifugal fan is efficient, yet its noise level is less than half that of typical high-speed blowers used on most package boilers. Baffle arrangement is simple, resulting in low draft loss . . . simple soot blowing . . . elimination of dead pockets . . . high heat absorption.

THE VU-10 BOILER

The VU-10 Boiler is designed for industrial load conditions, particularly for plants with small operating and maintenance forces. Capacities range from 10,000 to 60,000 lb steam per hr . . . pressures to 475 psi . . . heat recovery equipment is available if desired. Fuel can be either coal (C-E Spreader, Traveling Grate or Underfeed Stoker) oil or gas. This boiler is a completely standarized design adaptable to many conditions. It responds readily to variations in load; it is simple to operate and maintain. All parts are easily accessible for inspection. Like the VP, the VU-10 Boiler is a complete unit — boiler, furnace setting, fuel-burning equipment, controls, forced draft — bringing you the benefit of one contract . . . one guarantee . . . one responsibility.



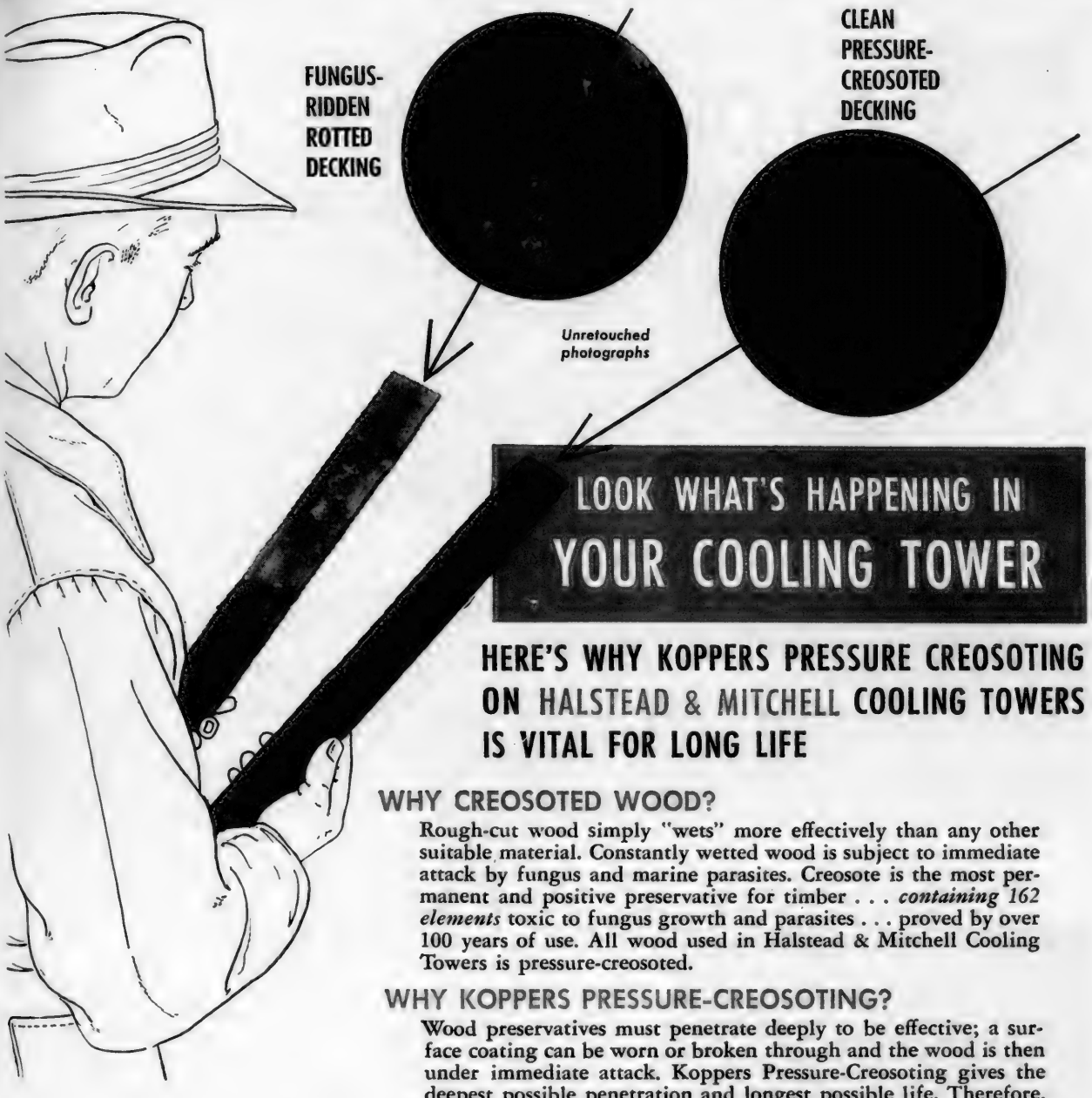
The VU-10 Boiler, as arranged for C-E Spreader Stoker firing

COMBUSTION ENGINEERING, Inc.

Combustion Engineering Building • 200 Madison Avenue, New York 16, N. Y.

ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT

B-689B



LOOK WHAT'S HAPPENING IN YOUR COOLING TOWER

HERE'S WHY KOPPERS PRESSURE CREOSOTING ON HALSTEAD & MITCHELL COOLING TOWERS IS VITAL FOR LONG LIFE

WHY CREOSOTED WOOD?

Rough-cut wood simply "wets" more effectively than any other suitable material. Constantly wetted wood is subject to immediate attack by fungus and marine parasites. Creosote is the most permanent and positive preservative for timber . . . *containing 162 elements* toxic to fungus growth and parasites . . . proved by over 100 years of use. All wood used in Halstead & Mitchell Cooling Towers is pressure-creosoted.

WHY KOPPERS PRESSURE-CREOSOTING?

Wood preservatives must penetrate deeply to be effective; a surface coating can be worn or broken through and the wood is then under immediate attack. Koppers Pressure-Creosoting gives the deepest possible penetration and longest possible life. Therefore, Halstead & Mitchell wetted decks are Koppers Pressure-Creosoted.

ONLY HALSTEAD & MITCHELL OFFERS THE

20-Year Guarantee!

ON THE WETTED DECK SURFACE

against rotting by fungus attack

2 thru 100 Tons

Sheet-Steel Cabinets,
3-times protected
Stainless Steel Fans and Shafts
Weather Shielding
Gravity-Type Distributing Pans
—no windage loss
Everdur Bolts for ease of
disassembly at any time.

Write for Catalogs

HM
Halstead & Mitchell

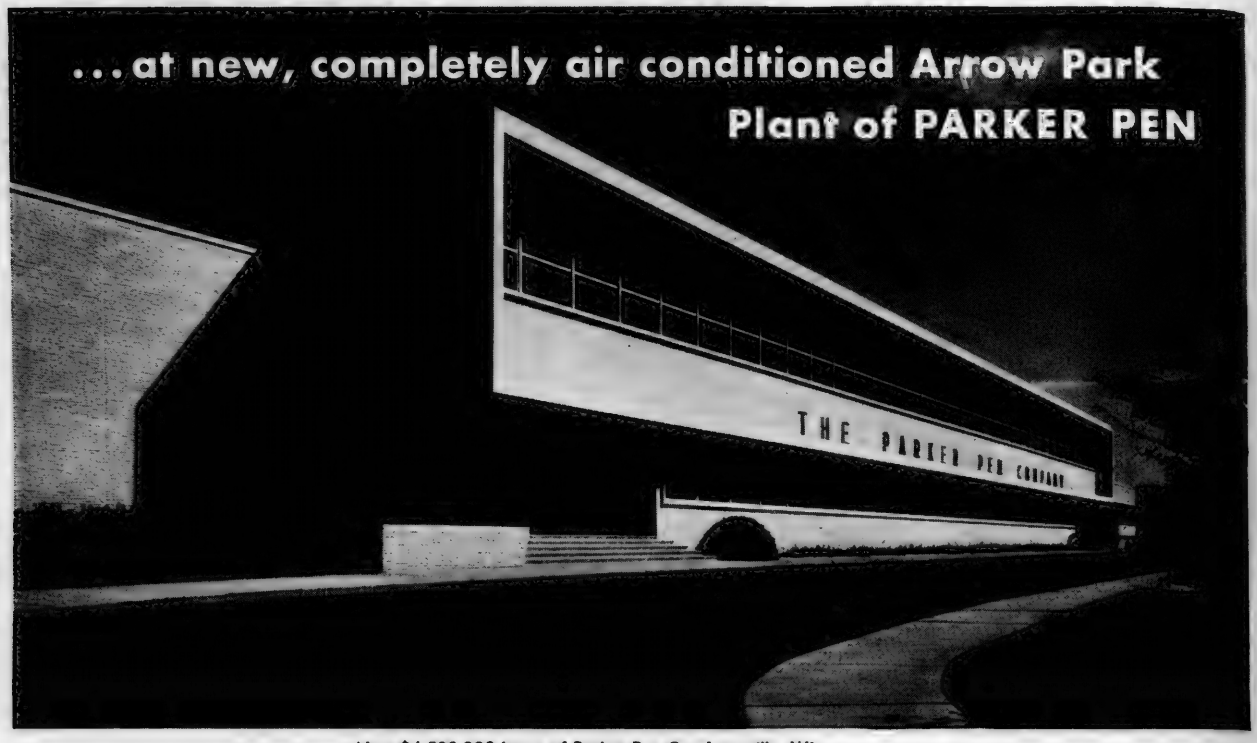
OFFICES: Bessemer Bldg., Pittsburgh 22, Pa.

BARBER COLMAN

"UNI-FLO" ENGINEERED

Air Distribution

...at new, completely air conditioned Arrow Park Plant of PARKER PEN



New $4,500,000 home of Parker Pen Co., Janesville, Wis.

Architect: John J. Flad and Associates, Madison, Wis.
Mechanical Engineers: Beling Engineering Consultants, Moline, Ill.
Air Conditioning Contractor: Hyland, Hall & Company, Madison, Wis.
General Contractor: T. S. Willis, Janesville, Wis.

Venturi-Flo Diffusers in the ceiling, Uni-Flo Return Grilles in the sidewalls provide fresh, conditioned air in the cafeteria.

Office staff keeps alert and efficient, works the year 'round in a comfortable, draft-free atmosphere made possible by the soundly engineered air distribution system.

While planning to invest many thousands of dollars in heating and cooling equipment, the makers of famous Parker "51" Pens agreed it would be folly to buy less than the best air distribution devices for their new 212,500 square foot plant in Janesville, Wisconsin. So, accepting the recommendations of the architect, engineer, and contractor, specifications were written for Barber-Colman diffusers and grilles, complete with latest accessories for most efficient air handling.

Two hundred and seventy-five Venturi-Flo Ceiling Diffusers, complete with Volume Controls and Deflectrols, are installed strategically in the offices and production areas. Three hundred and three Uni-Flo Return Grilles with removable cores and Volume Controls have been placed in the sidewalls. Air Turns in the supply ducts, plus double deflection cores mounted alongside fluorescent light units completed the job. The company is assured of the finest air distribution system known today—units which harmonize gracefully with the modern surroundings—units which have proved records for efficient diffusion, quiet operation, easily adjustable deflection and volume control, simplified servicing, and long-life, rigid construction.

You may find it equally wise to protect proposed investments in air conditioning equipment. Call your nearby Field Office for expert engineering assistance, or write us for your free copy of general bulletin F-4471-2.

BARBER-COLMAN COMPANY, DEPT. D, 1102 ROCK ST., ROCKFORD, ILL.

Automatic Controls • Air Distribution Products • Industrial Instruments
Aircraft Controls • Small Motors • OVERdoors and Operators • Molded Products • Metal Cutting Tools • Machine Tools • Textile Machinery

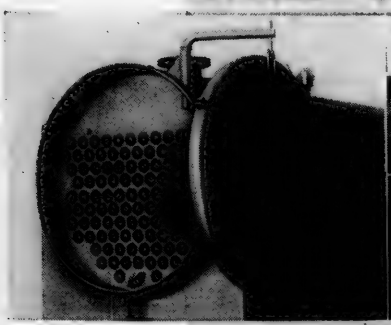
"COMPACT" IS THE WORD FOR THIS SPACE-SAVING TITUSVILLE BOILER

ALL SIZES FROM 129 TO 2500
SQ. FT. OF HEATING SURFACE

S.B.I. rated for known, dependable performance

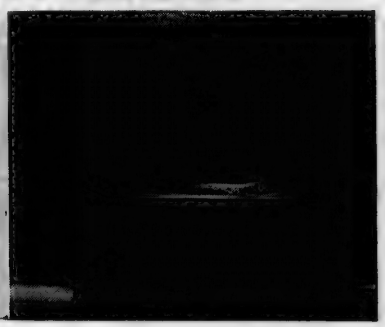
Modern, space-saving design makes the "Compact" Steel Heating Boiler particularly adaptable to cramped boiler-room areas . . . sturdy welded construction, large combustion chambers, long fire travel and positive circulation combine for high efficiencies and years of low-maintenance service! Get the facts—write for "Compact" Bulletin B-3000-B today.

TYPICAL "COMPACT" ENGINEERING FEATURES



Full width flue doors give quick access to all tubes for cleaning.

Smoke box at rear of boiler provides a natural soot hopper, easily cleaned.



Ample number of side circulators insure positive circulation, increased efficiency.

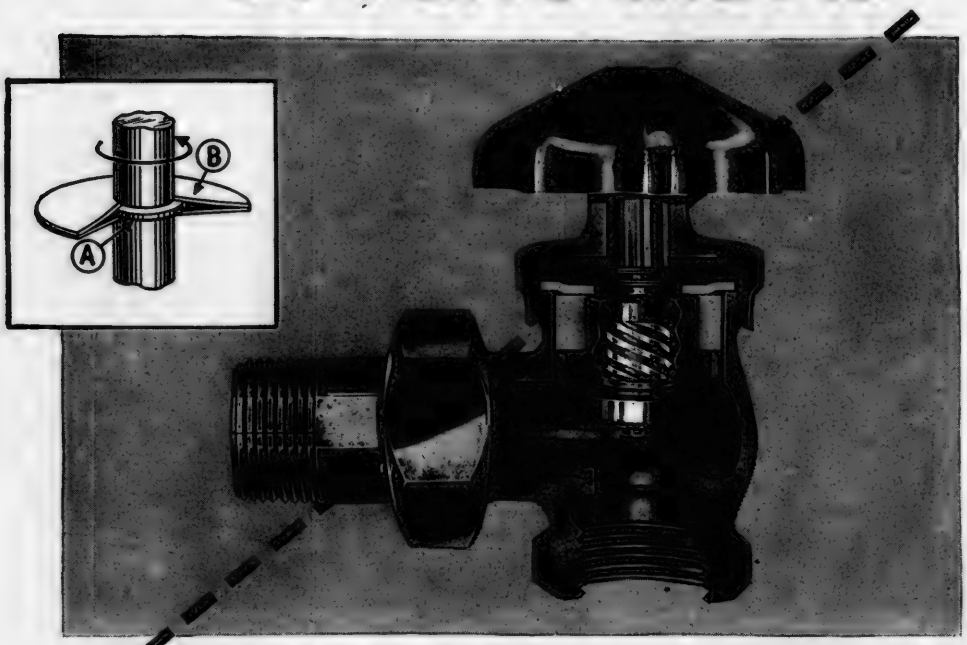
TITUSVILLE IRON WORKS CO TITUSVILLE, PA.

A DIVISION OF Struthers Wells

THE TITUSVILLE IRON WORKS COMPANY
TITUSVILLE, PENNA.

Manufacturers of **A Complete Line of Boilers for Every Heating and Power Requirement**

A Valve that is



PACKLESS in fact

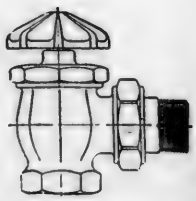
. . . *not just packless in name*

When the job calls for the kind of valve that will stand up across the years —when it calls for a valve that is packless in the full meaning of the word— then, no matter how far you look, you'll find in the Marsh Packless the only valve that completely fills the bill.

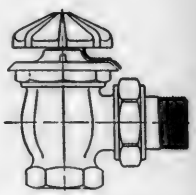
In fact, many users consider this the only valve that is packless in fact as well as in name, and they have a good reason for this. There is a difference between pack less and packless! The diagram tells the story of Marsh truly packless construction. A collar (A) is machined on the valve stem. The stainless spring steel wafers (B) press against this collar to form a tight annular seal This, you see, is a metal-to-metal seal—*permanently* leakproof.

And this better construction is typical of the quality and refinement found throughout the Marsh Packless Valve—in the swivel, self-seating, self-cleaning disc—in the excellent proportioning, machining, workmanship and finish.

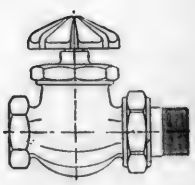
Packed valves can and do "blow out", scalding or burning the operator. This danger is avoided when you use the Marsh Packless. It is a valve you can rely on for any service up to 100 lbs. Furnished in a wide range of patterns including graduated and extended stem types, the Marsh Packless Valve is widely used for steam and hot water heating systems, coffee urns, steam kettles, sterilizers, ovens and similar services. Ask our representative or engineering department for facts.



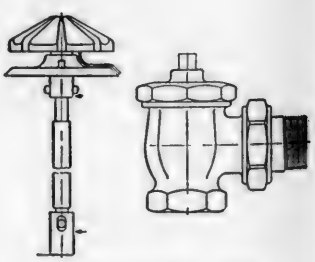
Wheel Angle



Wheel Angle Graduated



Globe



Extension stem

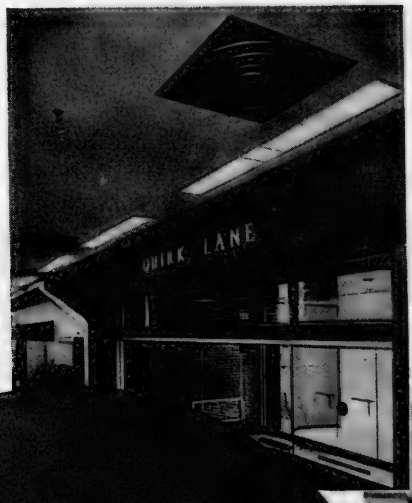
MARSH HEATING EQUIPMENT CO. *Sales affiliate of Jas. P. Marsh Corporation*

Dept. U, Skokie, Ill.

MANUFACTURERS OF GAUGES • THERMOMETERS • WATER REGULATING VALVES • SOLENOID VALVES

MARSH SINCE 1865

Quality Heating Specialties



THE HECHT CO., Arlington, Va. (left), relies on Kno-Draft to bring conditioned air into its Parkington-Arlington store. Kno-Draft's post-installation adjustability of air volume and direction reduces preliminary "engineering," maintains exact comfort level.

KAUFMANN'S, Pittsburgh, Pa. (below), gets draftless distribution of air to large open areas through Kno-Draft High Pressure Air Diffusers, Type HPC—using small space-saving exposed ducts, easy to install. Units adjustable from 90 to 180 c.f.m. or may be shut off.

ASSURING COMFORT FOR DEPARTMENT STORE CUSTOMERS

FAMOUS-BARR, St. Louis, Mo. (below), keeps its Southtown store comfortable for customers with regular Kno-Draft Adjustable Air Diffusers. Air circulates without drafts, and changes in store layouts present no problem as Kno-Draft Diffusers are adjustable *after* installation.

HUTZLER'S, Towson, Md. (above), uses special Kno-Draft High Pressure Air Diffusers that permit the air supply in a given area to be changed without unbalancing the air delivery of the other outlets, or creating objectionable noise. Installed cost comparable to conventional system.

STORES, restaurants, office buildings, factories—wherever there is an air distribution problem—will do better with Kno-Draft. For the full story, send for the latest edition of the Kno-Draft Data Book. Use the handy coupon or write Connor Engineering Corporation, Danbury, Conn.

CONNOR

kno·draft®

adjustable air diffusers

see our catalog in Sweet's or write for copy

CONNOR ENGINEERING CORP.
Dept. J-44, Danbury, Connecticut

Please send me the *new edition* of the Kno-Draft Data Book—without obligation, of course.

Name.....

Position.....

Company.....

Street.....

City..... **Zone**..... **State**.....

multi-vent® low velocity air diffusing ceiling panels

Eggers & Higgins, Architects • Irwin Clavan, Architect • Meyer, Strong & Jones, Consulting Engineers

in Pittsburgh's GATEWAY CENTER BUILDINGS

Out-of-sight Multi-Vent panels are installed behind the standard acoustical ceiling in all the interior bays of the first three office buildings.

Truly draftless, noiseless air conditioned comfort . . . for over 8000 office workers, summer and winter. Whether heating, cooling, or ventilating, Multi-Vent's gentle, pressure displacement air diffusion provides exceptional control and uniformity of room air motion and room temperatures.

Complete freedom in locating movable partitions. Partitions may even bisect a diffusing panel without disturbing in any way Multi-Vent's superior air flow pattern.

Complete freedom in location of lighting fixtures . . . for Multi-Vent panels are completely concealed in standard acoustical ceilings, and in no way interfere with interior design.

Radiant panel heating and cooling effect adds to the comfort factor. The large areas of the ceiling which function as distribution plates for Multi-Vent panels are heated or cooled to the temperature of the supply air.

MULTI-VENT DIVISION
Sales and Engineering Representatives in Principal Cities of United States and Canada

THE PYLE-NATIONAL COMPANY
1374 North Kostner Avenue • Chicago 51, Illinois

Easy to bend

Easy to bend

Easy to bend by hand

Chase Copper Tube makes radiant heating jobs easy for you...better for your customers. It's *soft* temper for easy bending...*light* for easy handling...and it comes in long lengths—so fewer joints are needed. Combined with Chase Solder-Joint Fittings, it makes a leak-proof, pressure-tight, *quality* system that's corrosion-resistant and can't clog with rust—*ever.* Order from your Chase wholesaler.

Chase ®

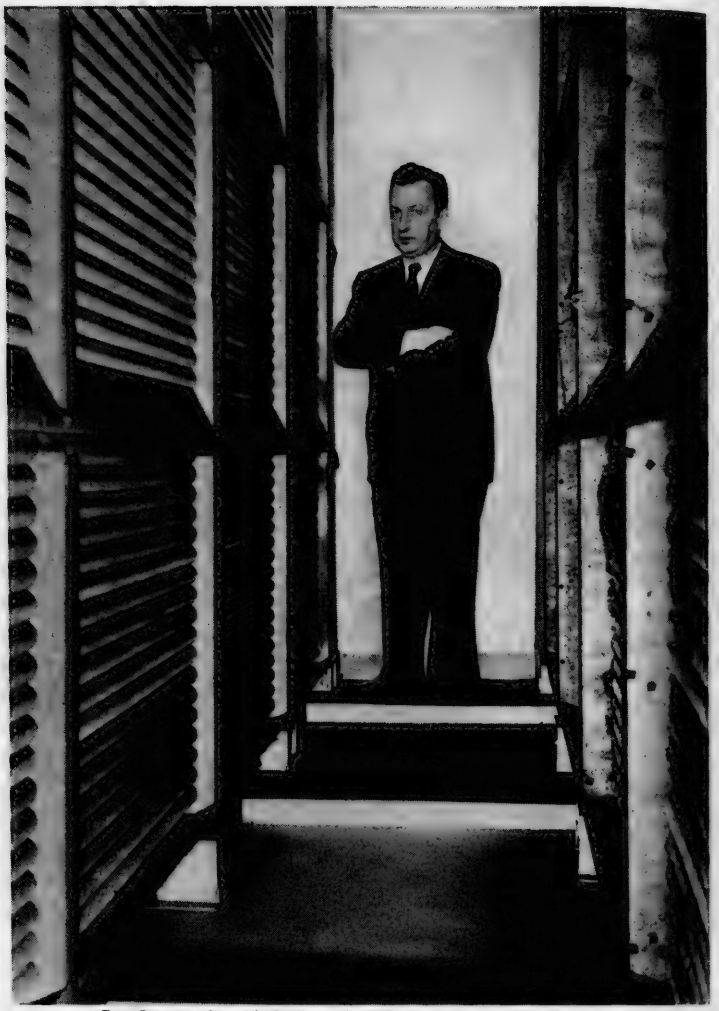
BRASS & COPPER CO.

WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

The Nation's Headquarters for Brass & Copper

Albany†	Chicago	Denver†	Kansas City, Mo.	Newark	Pittsburgh	San Francisco
Atlanta	Cincinnati	Detroit	Los Angeles	New Orleans	Providence	Seattle
Baltimore	Cleveland	Houston	Milwaukee	New York	Rochester†·	Waterbury
Boston	Dallas	Indianapolis	Minneapolis	Philadelphia	St. Louis	(†sales office only)

Why did the Waldorf choose TYPHOON coils to triple its cooling power?



Tom Barrett gives his Typhoon installation an approving once-over.

Tom Barrett, Building Superintendent of the Waldorf-Astoria, found himself with a whale of a problem.

Seems that when the original air conditioning system was installed in the Grand Ballroom, over 15 years ago, they didn't reckon with full capacity crowds or the hot blasts of TV lights.

Now, the capacity of the air handling equipment had to be tripled in order to cool the ballroom adequately.

This called for the installation of banks of chilled water cooling coils with new blower systems. To complicate matters, larger quantities of outside air brought in for ventilation purposes required new banks of pre-heating and heating coils.

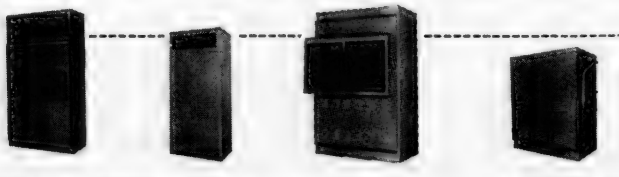
The consulting engineers, Seelye, Stevenson, Value & Knecht, looked about for a firm that could supply custom-built coils meeting the rigid standards of quality prescribed by this world-famous hotel. After exhaustive checking of qualifications and past performance records, one firm stood out – Typhoon.

Banks of cooling and heating coils were tailor-made by Typhoon for the job. Many were 8 rows in depth and 10 feet in length – copper tubes with helically bonded fins for maximum heat transfer, especially designed to fit into extremely limited space. And Typhoon made delivery in record time.

Now it's really a Grand Ballroom–summer and winter–with enough dependable cooling to accommodate the full capacity of 3000. Tom Barrett is satisfied that the rugged equipment standards of the Waldorf have been met–and then some. "Those Typhoon 8-row coils really wring out the moisture," he says happily.

And so another great name is added to the long list of famous Typhoon customers.

Whether the job calls for a single packaged air conditioning unit or a custom-built central plant–you can count on Typhoon. Quality engineering, backed by over 40 years of experience, is your guarantee of trouble-free performance.



Packaged Air Conditioning Units in 2-3-5-7½-10-15-20-25 horsepower sizes

Packaged Water Chillers 10 and 20 horsepower

TYPHOON

Write for detailed information

TYPHOON AIR CONDITIONING CO., INC.

794 Union Street, Brooklyn 15, N. Y.

Specialists in Air Conditioning Since 1909

FIRST...AND ONLY

COMPLETE LINE OF HOT WATER HEATING PUMPS

Offering a range of heads and capacities which meet the circulation requirements of residences, apartment buildings, institutions, commercial and industrial buildings, regardless of size

FEATURING...

Water-tight Mechanical Seal
Pioneered by B & G, this Seal has a long record of failure-proof performance. The extremely hard material from which it is made and its method of assembly assure long, dependable service.

Oil lubricating system
Genuine protection against wear! Oil is carried up by wool wicking from a reservoir and continuously keeps the shaft and bearings in a bath of oil.

Super-finished, hardened shaft
The shaft is big—*oversized*—affording large bearing surfaces. A specially heat-treated integral collar prevents end-thrust—deadly enemy of seal and motor bearing life.

Quiet, spring-type coupler
The arms of the B & G Coupler are held together with springs—a design which dampens vibration and noise...so successfully it is used on all B & G Heating Pumps up to 25 H.P.

Special motors
Motors are either built in the B & G plant itself or to rigid specifications. B & G Boosters up to 1¼" have smaller than usual motors—but have exactly the same capacity as previously. This motor is the first specifically designed to match the reduced size of modern boilers.

Forced hot water heating systems have expanded in application to buildings of every size and function...B & G Boosters and Universal Pumps have likewise expanded to satisfy all possible circulation requirements.

These pumps are designed and built specifically for forced hot water heating systems. In every detail, they are constructed to assure three things: First, quietness of operation...second, dependable, trouble-free performance...third, long life.

How successfully B & G Pumps achieve these goals is evidenced by the fact that more are sold than all other hot water heating pumps combined! For full information send for the B & G Catalog.

BELL & GOSSETT
COMPANY
Dept. DJ-4, Morton Grove, Illinois

Canadian Licensee: S. A. Armstrong, Ltd., 1400 O'Connor Dr., Toronto, Canada

At right: One of Four Frick Unit Conditioners Serving the Bankers Trust Company at Indianapolis.

This Shoe Store Rings-up More Sales Since the 5-hp. Frick Unit Air Conditioner and Duct System Shown were Installed.

TRADE FRICK MARK®

3-hp. Unit Supplying Conditioned Air to the Sales Room and Offices of a Dairy Bar in Mississippi.

Air Conditioning Will Help Any Business (Yours Included) Add-up More Profits—

By drawing more trade, getting customers to stay longer, and keeping your staff more alert, more loyal.

Whether you are a distributor or a user, Frick air conditioning will meet your requirements completely. We build packaged units in three sizes, and central systems of many types. Frick engineers are unbiased in recommending the exact equipment you need.

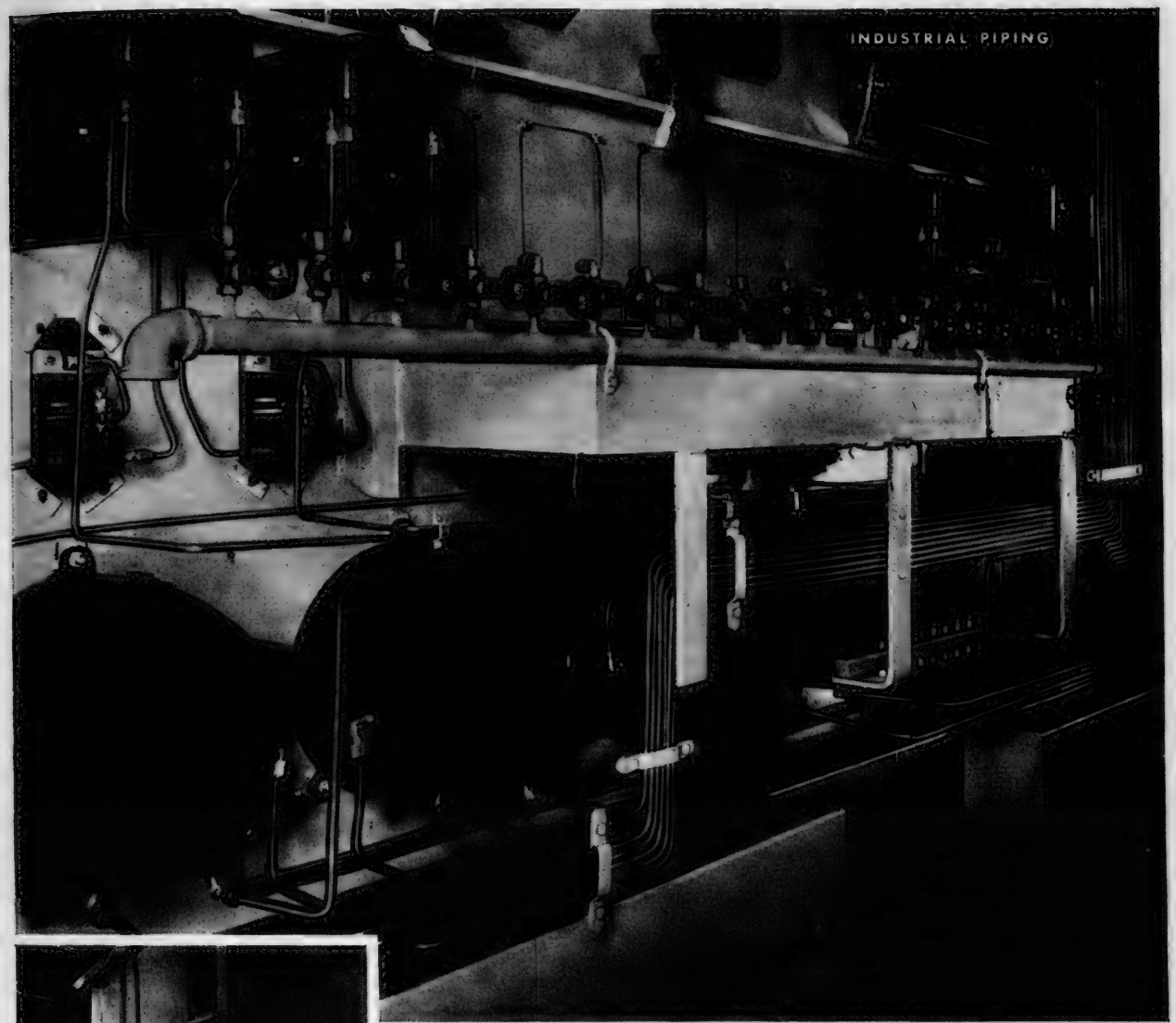
Get in touch with the nearest Frick man today. Branch Offices in principal cities: good territories for dealers still available.

DEPENDABLE REFRIGERATION SINCE 1882

FRICK CO.

WAYNESBORO, PENNA. U.S.A.

Below: Two 6-cyl. Frick "ECLIPSE" Compressors and Auxiliary Equipment Provide 120 tons of Refrigeration for Air Conditioning the New Student Union Building at Kansas State Teachers College, Pittsburg, Kansas.



THESE AIR SIGNAL LINES in Toronto's Richard L. Hearn Power Station use copper tube in long lengths, change direction and avoid obstructions without fittings.

MOIST COMPRESSOR AIR can never form rust or scale to impede control in this installation made by Bailey Meter Co., Ltd.

Wet air can't rust this copper control piping

CONTROL would be impaired if moisture could create rust or scale in these pneumatic control lines for coal-pulverizing equipment installed by Bailey Meter Company, Limited, in Toronto's Richard L. Hearn Power Station. A number of these copper tubes convey differential pressures to the pulverizer feeder controllers, while others transmit an air signal to the pulverizers to selectively limit the rate of coal feed. Rust particles which might interfere with the satisfactory operation of the control system cannot form, and the smooth bore keeps flow resistance at a minimum.

Here, as in all copper tube systems, the long lengths, the light weight and the elimination of many fittings by bending all make important savings in installation costs. Where flare or solder-type fittings are used, there are no threads to cut, and connections stay tight.

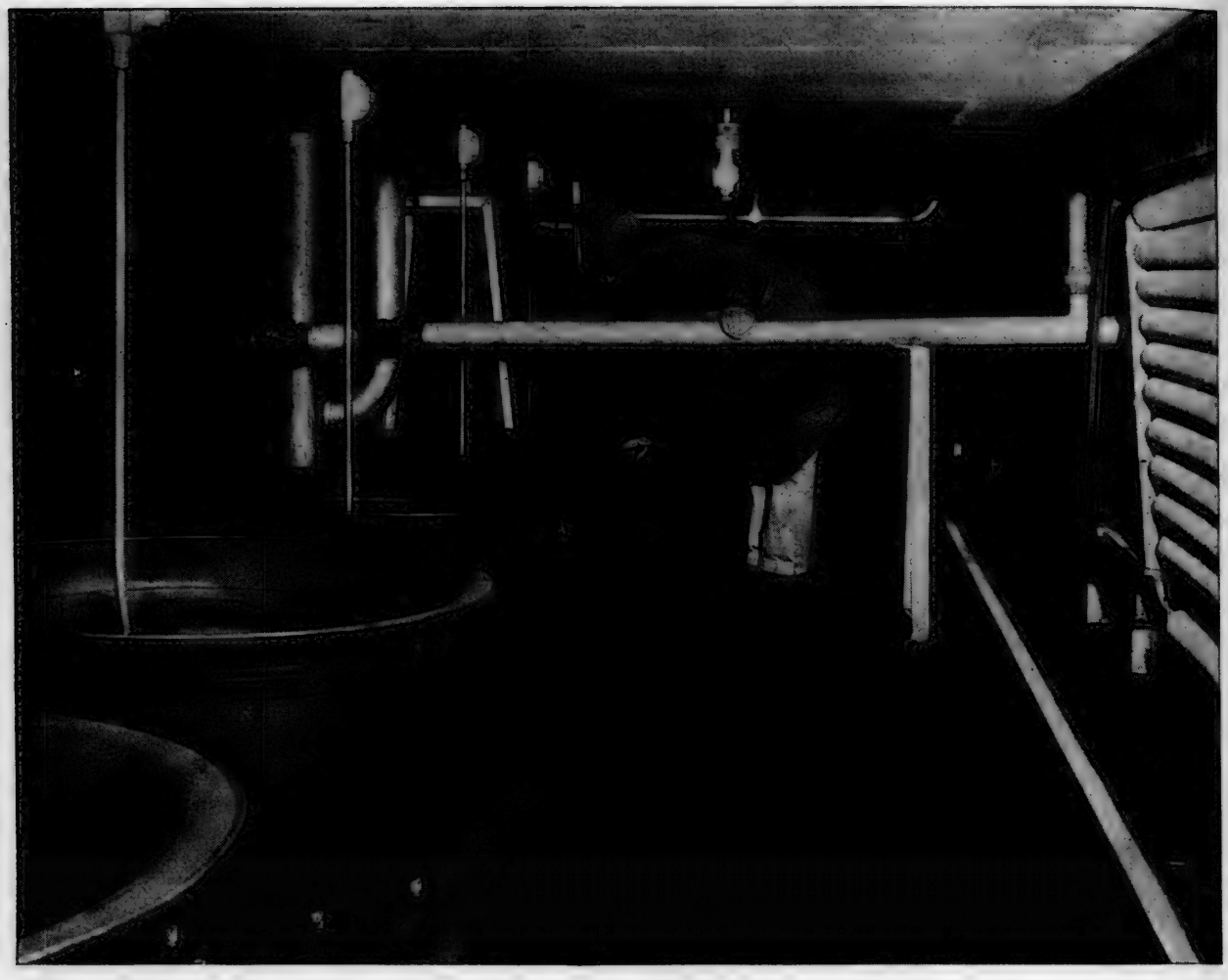
Publication C-24 offers many additional facts on how ANACONDA Copper Tubes can help improve product quality, reduce operating and maintenance costs and avoid costly shutdowns. Write to: *The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.* 5330

call your

ANACONDA®

distributor for

Copper tubes and fittings for industrial process lines, water, heating and sanitary drainage systems; American Flexible Metal Hose and Tubing; American Vibration Eliminators.



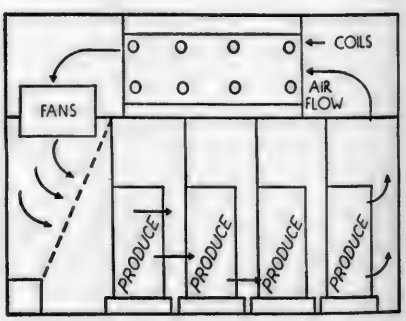
HOW WESTINGHOUSE FANS QUICK-FREEZE BERRIES TO MINUS 40°

When the berry packing season starts in Whatcom County, Washington . . . huge (110 ton capacity) freeze tunnels require fast, efficient air movement at 40° below zero . . . operating night and day for 3 solid months.

Baker Cold Storage Company called in the local Westinghouse-Sturtevant sales engineer and found that Westinghouse had the answer.

The result: eight Westinghouse-Sturtevant Axiflo Fans cold-blast the packaged fruit with 140,000 cubic feet of air per minute. This air moving system was originally guaranteed to freeze 46 tons per day . . . now handles 100 tons in a 24 hour day. Westinghouse fans have handled this grueling task with never a let-up for the past 8 seasons.

Whatever your problem in putting air to work, you will find the Westinghouse-Sturtevant sales engineer the most capable man to contact. Call your local Westinghouse-Sturtevant office or write Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Massachusetts.



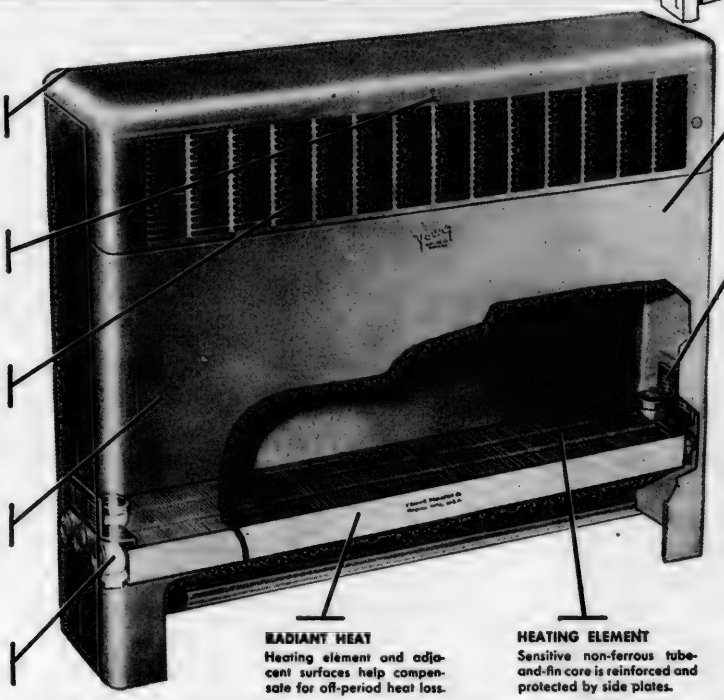
Eight Westinghouse Axiflo Fans deliver a total of 140,000 cfm of air at a temperature of minus 40° from refrigerating coils mounted directly above loading area . . . distribute evenly around the packaged fruit. This air is drawn down and directed laterally across 4 rows of fruit trucks, 10 trucks to a row, and returned to the overhead refrigeration coils for re-cooling. Trucks are loaded into the tunnel a row at a time with approximately an hour before the next loading. Alternate loading and unloading results in continuous, efficient, quick freezing.

WESTINGHOUSE AIR HANDLING

YOU CAN BE SURE... IF IT'S Westinghouse

There's More than Meets the Eye in YOUNG CONVECTORS

Take a look inside a Young Convector. Right away, you'll see many "hidden values" in Convector design features and construction quality. Such built-in value places Young Convectors in a class above the ordinary . . . assures easy installation, heating comfort and economy.



AIR SEAL
Strips of felt and/or corner gaskets prevent air leaks and resultant wall streaking.

DAMPER CONTROL
Chain control regulates damper and rate of air flow thru cabinet and heating element.

OVER-SIZE GRILLE
Louvers direct air outward and permit abundant heat delivery . . . greater capacity.

MODERN CABINET
Finished in prime coat . . . can be painted to match décor . . . safe, rounded corners.

SIMPLIFIED PIPING
Cabinet knock-outs and header casting design permit piping from top and bottom.

RADIANT HEAT
Heating element and adjacent surfaces help compensate for off-period heat loss.

HEATING ELEMENT
Sensitive non-ferrous tube-and-fin core is reinforced and protected by side plates.

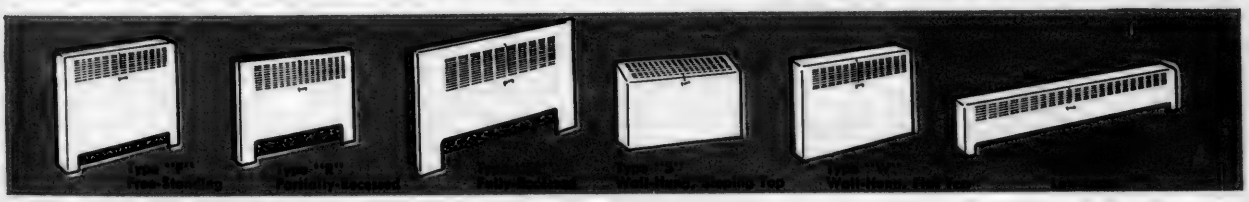
EASY TO CLEAN
One-piece front panel is easily removed for seasonal cleaning.

SIMPLIFIED HEATING ELEMENT SUPPORTS
Provide quick installation and pitching adjustments. Hold heating element securely.

PACKAGED FOR PROTECTION
Reinforced, stapled cartons protect convectors. Marked for easy identification.

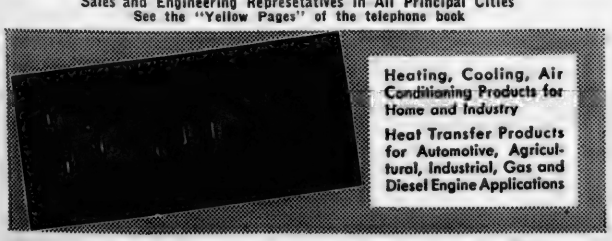
STANDARD RATINGS
The ratings of Young Convectors have been determined in conformance with Commercial Standard CS 140-47, as developed cooperatively by the trade and the National Bureau of Standards, U. S. Department of Commerce, and the said ratings have been approved by the Convector Rating Committee.

Whether you specify or install heating equipment, you'll be way ahead with Young Convectors. Only Young offers all the design features shown above. Young supplies Convectors at low initial cost, with six standard types available from stock to meet early delivery dates. Remember, too, every Young Convector has been rated and approved in conformance with Commercial Standard CS140-47. These advantages all add up to greater convenience for you . . . greater satisfaction for your clients or customers. For further details, see nearest Young Representative or write for catalog.



YOUNG RADIATOR COMPANY

Dept. 524-D, Racine, Wisconsin
Plants at Racine, Wisconsin and Mattoon, Illinois
Sales and Engineering Represetatives in All Principal Cities
See the "Yellow Pages" of the telephone book



Heating, Cooling, Air Conditioning Products for Home and Industry

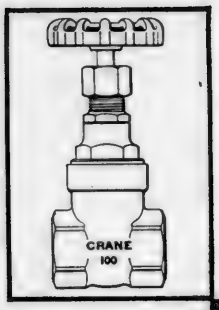
Heat Transfer Products for Automotive, Agricultural, Industrial, Gas and Diesel Engine Applications

Leaders in Heat Transfer Engineering for more than 25 years

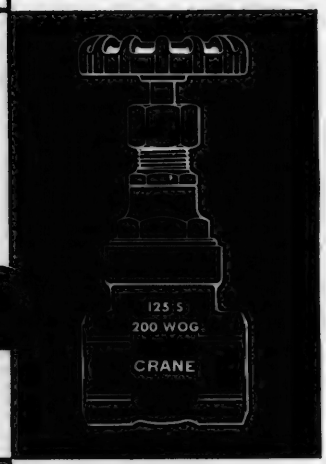
CONTRACTORS

All Young Convectors are packaged in clearly marked, reinforced cartons for unit protection and ease in identification on the job. Adjustable support (see above) also holds heating element rigidly in place and permits shipping element in cabinet for quicker installation.

NEW* brass gate valves by CRANE



No. 410,
100-Pound



No. 438,
125-Pound

No. 437,
150-Pound

* NEW SHAPE... NEW STRENGTH

for 3 All-Time CRANE favorites

Here are valves that didn't have to be changed . . . because each has long been the best in its class. But Crane found ways of improvement to give you an even better buy for your brass valve dollars.

For example—here is greater strength, greater rigidity, made possible by the new cylindrical upper body . . . the same basic shape as high-pressure steel valves. Here, too, is an improved stuffing box that screws into the bonnet—also better stem support to assure truer alignment and minimize wear on the packing.

And not to be overlooked is their clean, modern appearance—a very desirable advantage for all of your "exposed" installations. Sizes ¼ to 3 in. Ask your Crane Representative all about this improved brass valve line next time he calls.

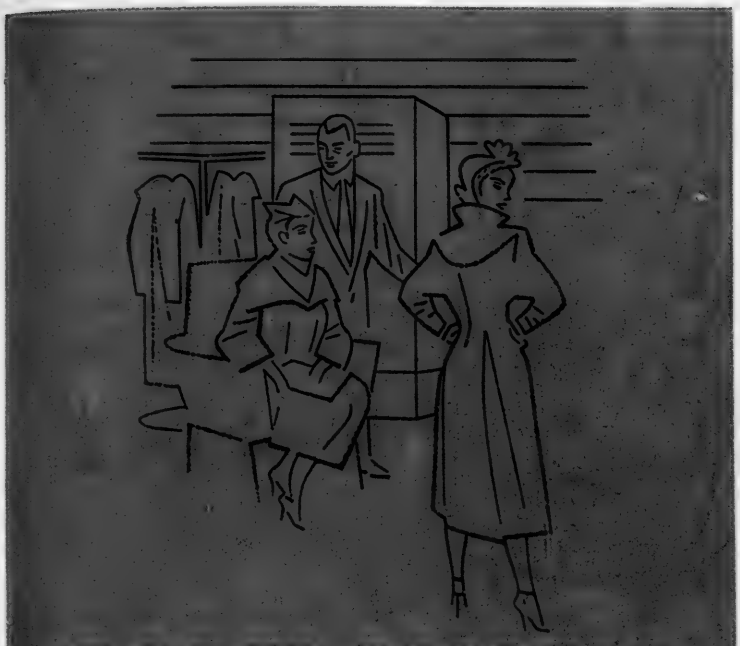
just off the press . . .
new four-page folder with complete facts including sizes, prices and dimensions. Send for yours today. Ask for Brass Valve Folder AD1944.

THE BETTER QUALITY . . . BIGGER VALUE LINE . . . IN BRASS, STEEL, IRON

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING



COPELAMETIC

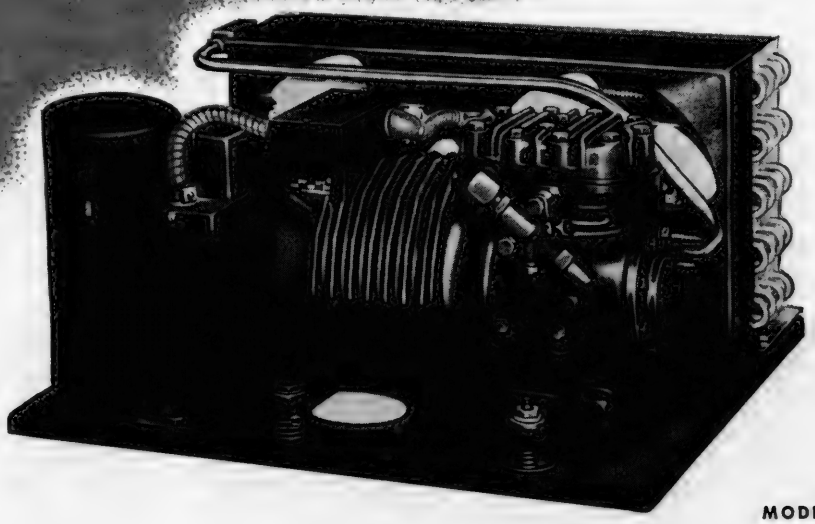
THE *Accessible* HERMETIC

compact . . . dependable . . . quiet . . .

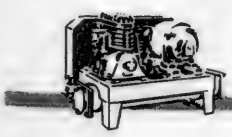
Compact . . . dependable . . . quiet. Those are the prime requirements for the refrigeration unit in any air conditioning system. Add to them ruggedness, accessibility and long life and you have the COPELAMETIC.

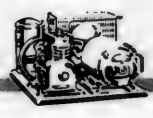
For the unit that has everything, look to Copeland the pioneer. Practical-minded engineers designed this modern unit without belts, seals or manual oiling, and to top that they made it accessible for servicing on the spot. Specify COPELAMETIC and be sure of a satisfied client for years to come.

There's a Copeland unit for every type air conditioning installation from smallest to largest. Air-cooled, remote COPELAMETICS are made from ¼ thru 3 HP. There are water-cooled, remote units from ⅓ thru 7-½ HP. Self-contained COPELAMETICS are available for all applications. For complete details, write us or call your refrigeration dealer.



MODEL DE-100 ILLUSTRATED





REFRIGERATION UNITS (OPEN-TYPE AND COPELAMETIC) WATER COOLERS

Copeland

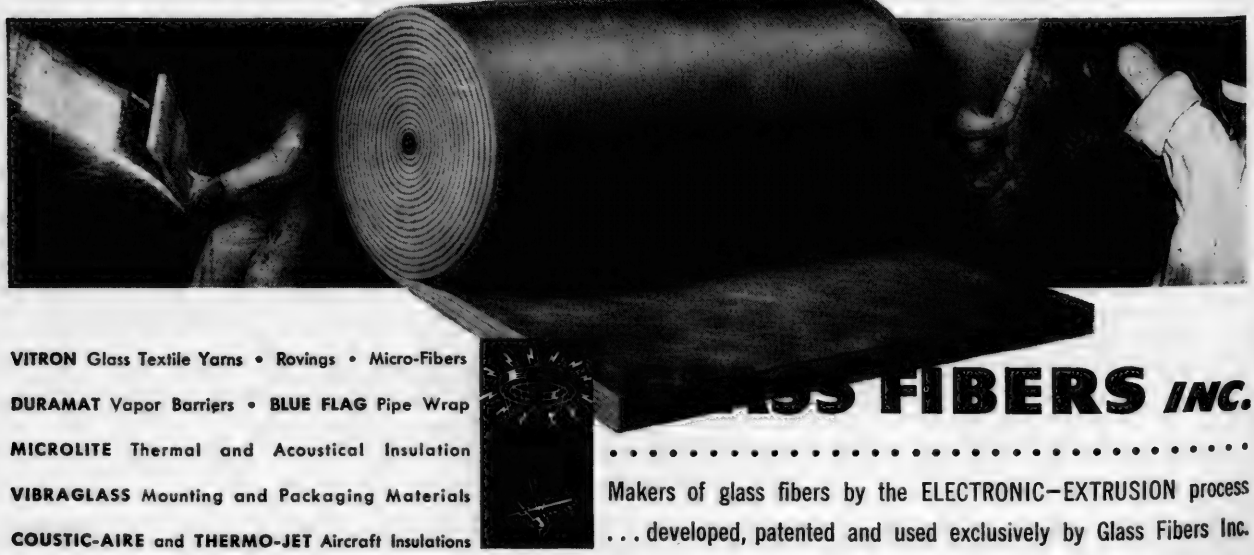
DEPENDABLE *Electric* REFRIGERATION

COPELAND REFRIGERATION CORPORATION • SIDNEY, OHIO

In a pinch it's a cinch ...with MICROLITE

Ducts get into the darnedest places. But so does Microlite glass fiber insulating wool! Microlite is so soft and compressible and lightweight it can be wrapped easily around any shape or system—in the hardest-to-get-to locations. Clings like the proverbial vine. Is so tough it doesn't have to be babied. Doesn't itch. Cuts easily with knife or scissors. Can be quickly fastened by adhesion or stapling. And on top of all that, inch for inch Microlite is one of the most effective of all insulating materials from sub-zero to 400° F. For folder and samples write to Glass Fibers Inc., 1810 Madison Avenue, Toledo 2, Ohio.

MICROLITE *is an excellent absorber of sound* • **MICROLITE** *is inorganic, resists fire and moisture*
MICROLITE *is fungus-and-bacteria proof* • **MICROLITE** *is shipped in space-saving rolls compressed 4-to-1*



VITRON Glass Textile Yarns • Rovings • Micro-Fibers
DURAMAT Vapor Barriers • **BLUE FLAG** Pipe Wrap
MICROLITE Thermal and Acoustical Insulation
VIBRAGLASS Mounting and Packaging Materials
COUSTIC-AIRE and **THERMO-JET** Aircraft Insulations

GLASS FIBERS INC.

Makers of glass fibers by the ELECTRONIC–EXTRUSION process . . . developed, patented and used exclusively by Glass Fibers Inc.

The most convincing stamp of user satisfaction

ANOTHER REPEAT ORDER FOR SARCO

Tuberculosis Hospital, latest addition to Kings County Hospital Center, Brooklyn, New York.

Architect: James Gamble Rogers Successors: Rogers & Butler
Mechanical Engineers: Clark, MacMullen & Riley
Heating Contractors: Fred Brutschy Company, Inc., N.Y.C.
Specification Approval: N.Y.C. Dept. of Public Works

First in 1930 *and seven times since*

Kings County Hospital Center relies on Sarco Heating Specialties

Whenever you find equipment specified and accepted eight times running, you can be sure there's a sound reason for it.

At Kings County Hospital Center, that reason is *Sarco dependability*.

Since 1930, Sarco heating specialties were installed on eight separate jobs. The latest installation was made in the new Tuberculosis Hospital.

Now, over 6000 Sarco products contribute to the dependability and efficiency of Kings County Hospital Center's vitally important heating system and hot water supply. Sarco heating specialties are installed throughout, including the nurses' home, laundry and kitchen. Sarco self-operated temperature regulators are used on hot water storage.

There's no more convincing evidence of Sarco dependability than this impressive record of repeat orders. Specify Sarco on your next job and be assured of similar user satisfaction.

We'd be happy to send you full information on Sarco's complete line of heating specialties.

SARCO

Sarco quality assures satisfaction

Here's why so many architects, engineers and heating contractors specify and install Sarco

—job after job.

- **Proven dependability**
- **Trouble-free service**
- **Complete line from one reliable manufacturer**
- **Nationally known and preferred**

SARCO COMPANY, INC., Empire State Building, New York 1, N. Y.
Sarco Canada, Ltd., Toronto 8, Ontario . . . Represented in Principal Cities

STEAM TRAPS • TEMPERATURE CONTROLLERS • HEATING SPECIALTIES

20TH OIL HEAT SHOW

NATIONAL Indoor Comfort EXPOSITION

HEATING—COOLING

32ND ANNUAL OHI CONVENTION

Yes, everybody interested in Automatic Oil Heating...

Architects, engineers, builders, contractors, dealers, distributors, wholesalers and jobbers—will fill all traffic lanes getting to *their* National Show to see what's new in heating and year 'round air conditioning.

No registration fee

There's no registration fee for anyone to see the exposition—it's free! And there's no fee for anyone to attend the general sessions at the 32nd Annual OHI Convention. Both affairs are under one roof—the Commercial Museum, Philadelphia, on May 16 thru 20. *So come!* See and learn what's new.

Service, Sales and Installation

Ideas a-plenty for you on new methods, new systems, new practices which you can take home and use—profitably. Questions will be asked and answered on *heating and cooling* at the convention's general sessions. They run from 9:30 A.M. 'til noon, Monday thru Thursday. The exposition is open at 1 P.M. Sunday, May 16, thru Thursday, May 20.

Better make hotel reservations now!

Advance hotel reservations are extremely heavy. Just drop a note to the Sales Department, Benjamin Franklin Hotel, Philadelphia. Tell them you're coming to the OHI Convention-Exposition; advise when you'll arrive and depart and the accommodations you want there or at the hotel of your choice. They'll do their best for you.

Come and see what's NEW
No registration fee for anyone

AN INVITATION TO
Architects
and
Engineers
primarily interested in
COMMERCIAL-INDUSTRIAL JOBS

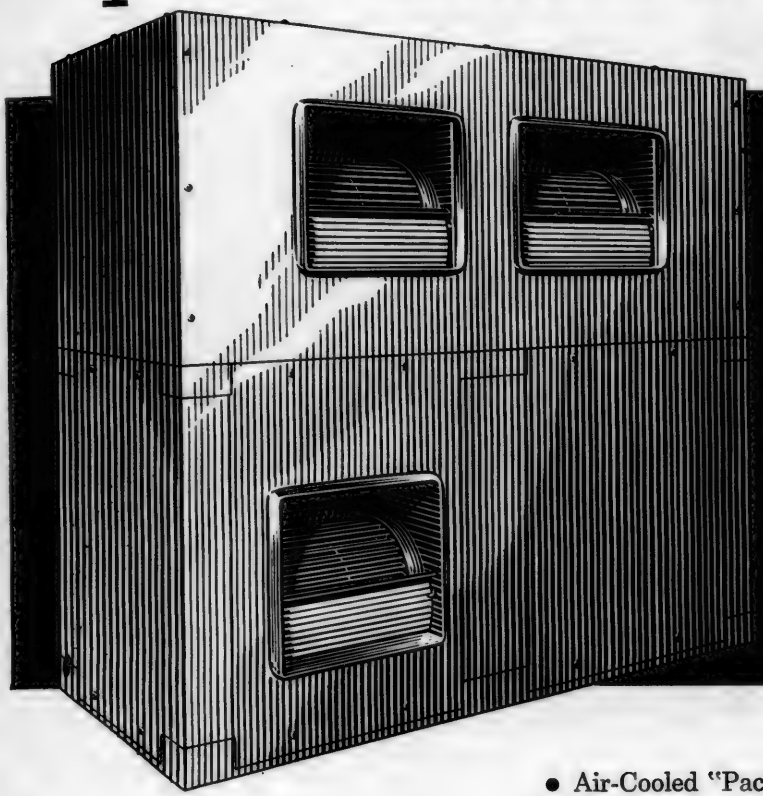
A special program has been arranged for you by the Institute's Commercial-Industrial members. You are invited to hear a short talk on heavy fuel oil handling and its combustion by a well-known authority. Following this talk, refreshments will be served.

Time: 5 until 7 P.M., Wednesday, May 19, 1954
Place: Room A, Commercial Museum, Philadelphia

OIL-HEAT INSTITUTE OF AMERICA, Inc.

500 Fifth Ave., New York 36, N.Y.
Phone LOngacre 4-3755

1 *of the many reasons why you will find it pays to sell Chrysler Airtemp*



Another Chrysler Airtemp "First"

AIR-COOLED "PACKAGED" AIR CONDITIONING

now offers you and your prospects

many big advantages!

• Air-Cooled "Packaged" Air Conditioning, pioneered by Chrysler Airtemp, already tested and proved in a wide variety of commercial installations, operates entirely without water—uses only air and electricity. It makes air conditioning practical for businesses which have problems of water supply, water expense or water disposal—thus increasing your market tremendously.

Air-Cooled Air Conditioning in Chrysler Airtemp's compact package costs you less to install because no plumbing is necessary. Wherever installed, it will cost your customers less to maintain.

Air-Cooled "Packaged" Air Conditioners, in 2, 3 and 5 horsepower sizes, supplement the long-established Chrysler Airtemp line of six water-cooled models, 2 through 15 horsepower. They constitute an important new reason why it will pay you to sell Chrysler Airtemp. Check the additional reasons listed at left. Then fill in and mail the coupon for complete details!

7 *more advantages you sell with when you sell Chrysler Airtemp . . .*

- **Consumer Confidence**—people know the Chrysler Airtemp name—associate it with engineering leadership—have confidence in the products which carry it.
- **Lower Installation Cost**—super-quiet operation permits use within or very close to areas to be cooled, reducing amount of ductwork required. All units shipped completely factory-assembled and tested.
- **Assured Dependability**—Chrysler Airtemp pioneered "Packaged" Air Conditioning in 1937, has more units in use today than anybody else. All units are manufactured to exacting standards of precision in a modern, windowless, completely air conditioned factory.
- **Advanced Engineering** by Chrysler Airtemp offers your customers features that mean more because they do more for them.
- **5-Year Compressor Warranty**—covers replacement of compressor, freight and labor.
- **More National Advertising**—6 big campaigns reaching all prospects for air conditioning; 22 campaigns in trade journals constantly selling the particular benefits of Chrysler Airtemp "Packaged" Air Conditioning to individual businesses and professions which make up your most important markets.
- **More Local Selling Helps**—the broadest line of tested and proved local selling helps for dealers.

Guaranteed by Good Housekeeping

CHRYSLER AIRTEMP

heating • air conditioning for homes, business, industry

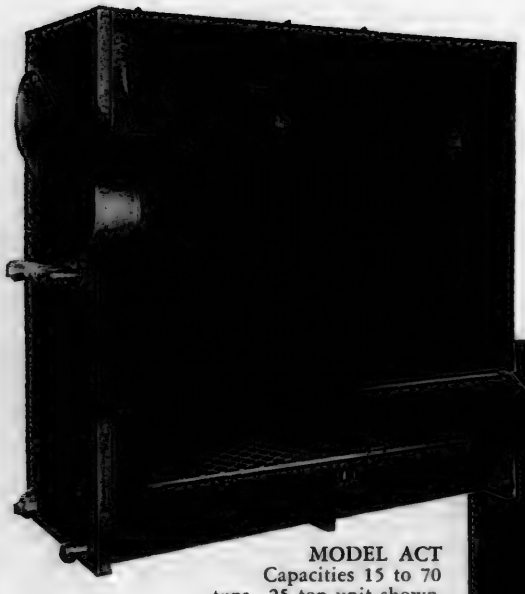
Airtemp Division, Chrysler Corporation, Dayton 1, Ohio

Airtemp Division, Chrysler Corporation H&V-4-54
P.O. Box 1037, Dayton 1, Ohio
I would like to know more about the Chrysler Airtemp Franchise.

Name_____

Address_____

City_____ Zone____ State_____



MODEL ACT
Capacities 15 to 70 tons. 25 ton unit shown.

ease of installation: Acme's compact, pre-assembled, packaged units simplify field erection since they are ready for either indoor or outdoor service when they leave the factory; choice of air discharge direction with either front or rear air intake allows you to fit the job with minor field adjustments. A complete selection of pumps is available. They are integrally mounted and piped at the factory.

Acme

has what you are looking for in

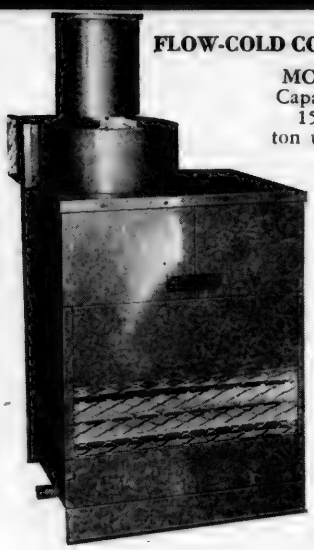
COOLING TOWERS

top performance: Induced draft by means of centrifugal type fan wheels, dynamically balanced for smooth, quiet, efficient operation, assures constant capacity at all times regardless of wind conditions.

Acme's heavy duty all metal eliminators produce maximum changes in direction of air flow while removing entrained water droplets with low static loss. The new heavy gauge steel "Acme-Pak" is designed to provide the maximum in cooling effect.

Both the eliminator and pack are encased in a tight fitting exterior framework resulting in quiet operation and the prevention of air leakage, assuring efficient performance.

durability: Acme's completely galvanized construction of heavy gauge steel and die formed structural panels provides extra strength, extreme rigidity, freedom from vibration and long trouble-free life.



FLOW-COLD COOLING TOWER
MODEL JCT
Capacities 3 to 15 tons. 5 ton unit shown.

Stocked throughout the country by quality wholesalers

ACME
AIR CONDITIONING
REFRIGERATION

ACME INDUSTRIES, INC.

Mfgs. of a complete line of Air Conditioning and Refrigeration Equipment

JACKSON, MICHIGAN

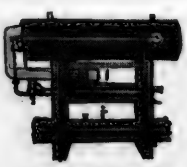
Evaporative Condensers
Cooling Towers
Floor-type Unit Coolers

Direct Expansion (Dry-Ex) and Flooded Liquid Chillers

Heat Exchangers, Oil Separators

Shell and Tube, Shell and Coil Condensers

Receivers, Pipe Coils



Packaged Liquid Chillers to 225 tons

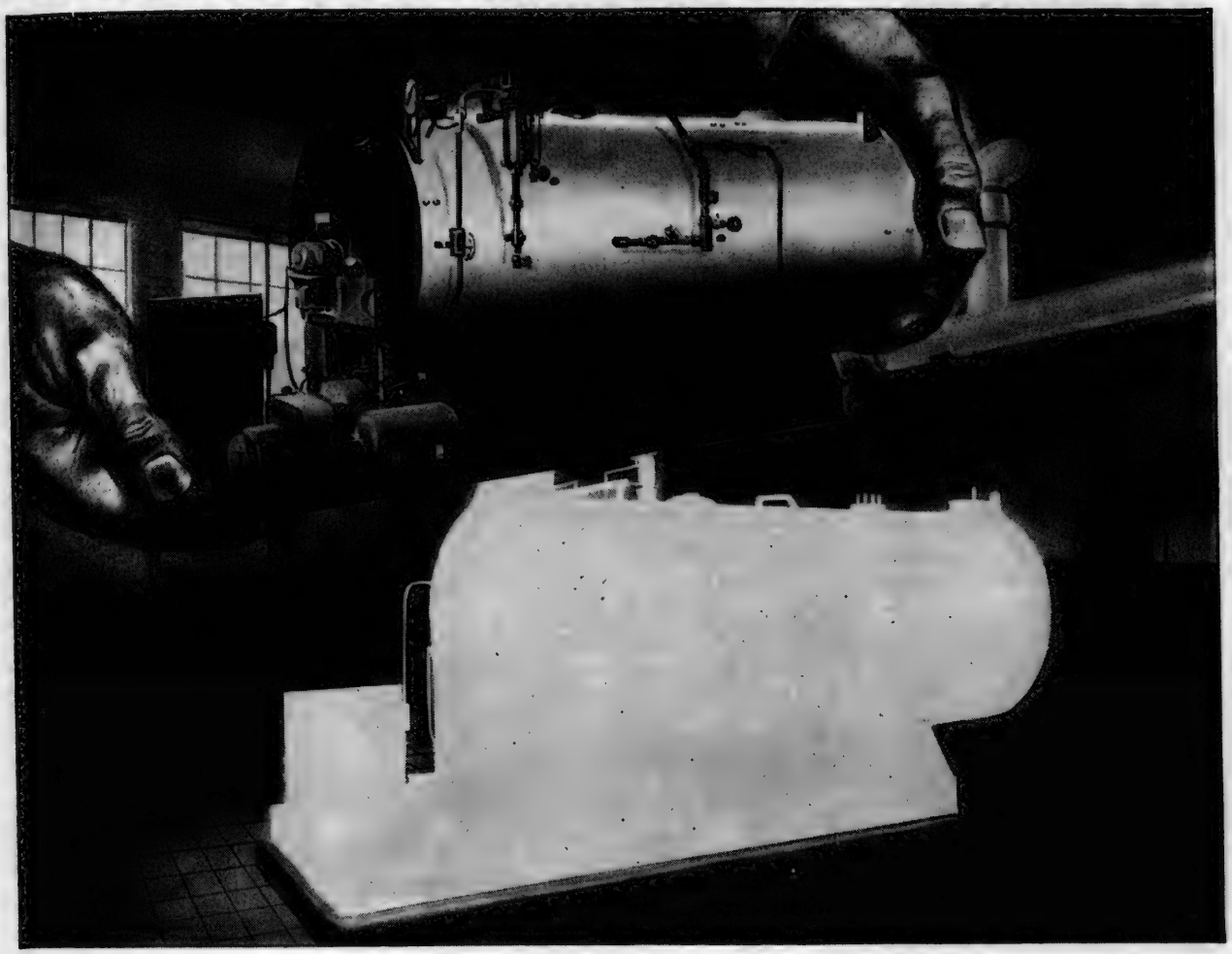
Flow-Temp Heat Pumps

Flow-Cold Liquid Chillers

Remote Room Conditioner

Continuously serving the air conditioning and refrigeration industry since 1919

Here's why you get more...when you buy a Cleaver-Brooks Self-Contained Boiler



...only Cleaver-Brooks can offer you the experience gained from more than 20 years of pioneering . . . and more than 12,000 individual "packaged" boiler installations

CLEAVER-BROOKS pioneering has been largely responsible for simplifying boiler buying . . . lowering costs of installation . . . delivering 80% guaranteed steam efficiency from every fuel dollar when firing with oil.

Boilers can be shipped as completely assembled and tested self-contained units, with auxiliaries as required. Installation involves minimum of time, construction and space. Usually connections only to steam, fuel, water lines and electrical service are needed. No special foundations are required. A short vent takes care of exhaust gases. Frequently, boilers are ready for use in a matter of *hours*, depending on availability of service lines.

Cleaver-Brooks, originators of the self-contained boiler, offers wider experience that counts in another important way. Qualified engineers help you plan steam plants tailored *exactly* for your needs. Carefully analyzed are loads, space and equipment arrangement. This not only helps you solve present steam needs, but adds flexibility for future expansion as well.

This application engineering, plus basically sound design and construction is your assurance of a full return from your boiler investment. When you specify a self-contained boiler — make sure it's a Cleaver-Brooks.

Cleaver-Brooks steam or hot water boilers for heating and processing are available for oil, gas or combination oil/gas firing. Sizes: 15 to 500 hp, 15 to 250 psi. Write for Catalog AD-100.

CLEAVER-BROOKS COMPANY
Dept. D-314 E. Keefe Ave.
Milwaukee 12, Wisconsin, U.S.A.

Cleaver-Brooks

ORIGINATORS OF THE SELF-CONTAINED BOILER

Steam Boilers • Oil and Bitumin Tank Car Heaters • Distillation Equipment Oil and Gas Fired Conversion Burners

is something
ALWAYS
missing?
(to cut your profit)

...then switch to the one line that meets every selling need

* **EXAMPLE No. 2:** You'll agree that maintaining your profit depends largely on minimizing profit-shrinking "call backs" or better—eliminating them entirely. That's why—at Bryant—we strive *first* to give you a quality product . . . secondly for a competitive price. And that's why, as a Bryant dealer you can confidently expect this significant selling advantage. A quality product . . . priced to sell competitively . . . engineered to protect your profit . . . designed to become a permanent advertisement for your services.

Your nearby Bryant Distributor has complete details. It will pay you to call him today.

bryant®

HEATING | AIR CONDITIONING WATER HEATING

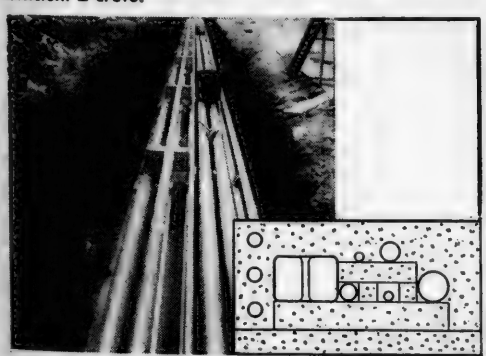
1. The most complete line in the industry
* 2. Quality products—Competitively priced
3. Established name—Good customer acceptance
4. Broad, attractive profit margins
5. Local Distributor warehousing and service
6. Factory district representatives and traveling sales training and service teams

Bryant Heater Div., Affiliated Gas Equipment, Inc., 17825 St. Clair Ave., Cleveland 10, Ohio

Even Tough Jobs Are Easy for "Z" crete®

No pipe too small or too large to be insulated with Z-crete. Here in city streets a large utility installs a monstrous 30″ low pressure steam supply and 10″ return pipe. Both pipes are contained in a single Z-crete conduit.

A large tank farm pipe assembly insulated with Z-crete on grade. Some of the large Z-crete conduits are used as walkways. On several occasions area has been flooded with no harmful effect on permanent, efficient Z-crete.



In this large hospital area Z-crete effectively insulates the complicated piping system between all buildings. Special support block shapes can be manufactured to meet special needs. Z-crete conduit is in effect a supporting pipe sleeve.

these actual photographs show how Z-crete is solving the toughest job problems

What other insulation for underground piping offers all these superior advantages

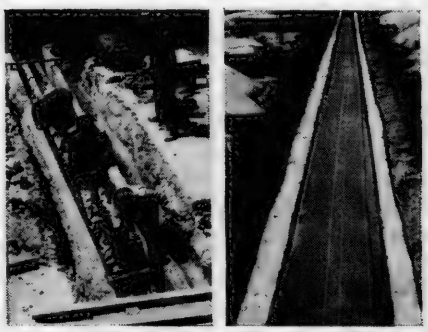
★ **MORE ADAPTABLE**—Z-crete is a field fabrication. Piping contractor has an easy-to-work-on concrete base pad for installing pipe. Pipes are installed—*then* insulated.

★ **MORE ECONOMICAL**—Low in cost, provides permanent and stable insulation. Especially economical in large-pipe or multiple-pipe installations.

★ **MORE EFFICIENT**—Z-crete's monolithic pour eliminates heat loss due to air movement. Six inches of insulation around pipe provides PLUS insulation value.

★ **PERMANENT**—Will not rot or deteriorate...water can't flow through Z-crete. Resilient, completely fire-proof.

★ **READILY AVAILABLE**—Z-crete materials are readily available from our many strategically located plants throughout the United States and Canada. Z-Crete is furnished and installed only by licensed applicators of Zonolite Company under U.S. Patent No. 2355966 —Canadian Patent No. 439356. There is an applicator near you.



Many conduits are reinsulated with Z-crete. On this job water had ruined sectional pipe covering insulation. Pictures show before and after reinsulation. (Special pump equipment makes possible reinsulation with minimum of excavation.) It is economical to reinsulate in this manner if piping is good but insulation has deteriorated.

"Z" crete

DIVISION
Zonolite Company

Write for FREE Booklet

Zonolite Company, Dept. HV-44
135 S. LaSalle St., Chicago 3, Ill.

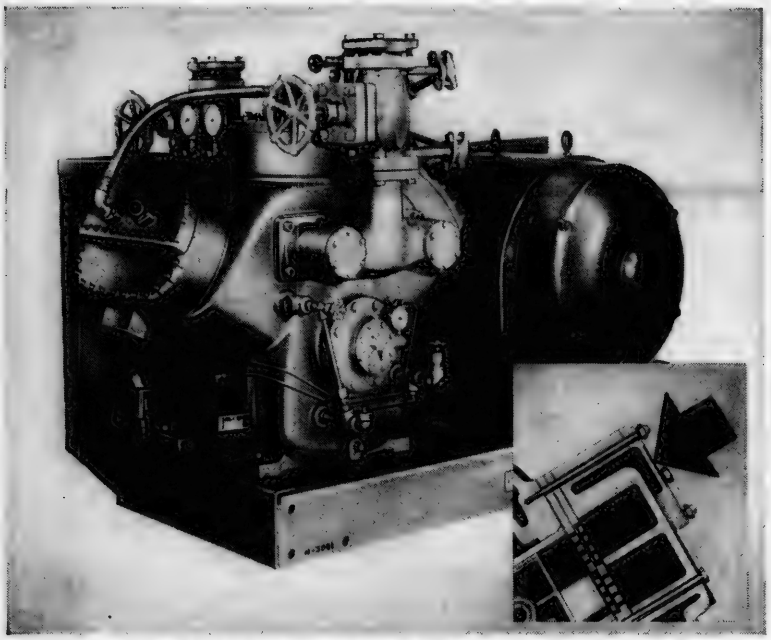
Please rush free Z-crete Booklet Z-11 with full details about this easier, better insulation of underground heated piping.

Name.....

Address.....

City.....*Zone*....*State*.....

Look at all the features of Worthington's new high-speed ammonia compressor



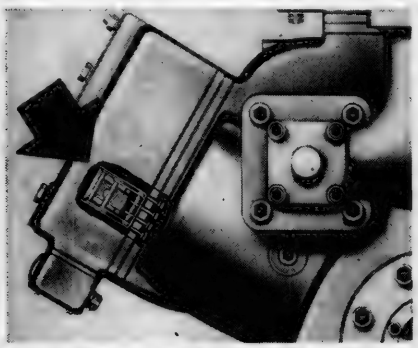
IMPROVED INTERNAL MANIFOLDING—cool suction gas completely surrounds the cylinder walls, providing longer valve life and increased overall efficiency. All passageways between suction discharge and shutoff valves are cast integrally within the crankcase, eliminating outboard fittings. Cross section shows water jacketing on one of the cylinders.

High operating efficiency and lighter weight make this modern unit the talk of the industry

These lightweight, compact Worthington ammonia compressors have the same high operating efficiency and versatility as their lower speed counterparts.

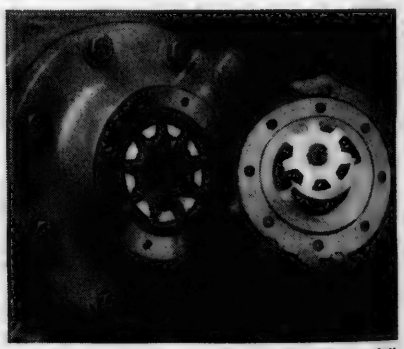
Ranging in capacities from 18 to 150 tons, the new units can be used as high-stage or booster machines.

Get in touch with your nearest Worthington district office for more facts about these rugged compressors. Or write to Worthington Corporation, Air Conditioning and Refrigeration Division, Section A.3.56, Holyoke, Mass.



ELECTRIC UNLOADING—a new achievement in variable capacity control. You can start compressor with a normal torque motor; power consumption is automatically balanced against load. Separate unloader units allow easy maintenance . . . no oil or gas pressure lines to worry about.

NEW SUCTION MANIFOLD, with cover plate over suction strainer inlet, allows easy removal of the suction gas strainer for cleaning, without disturbing any of the pipes, valves or other parts. The strainer is unique in that it fits entirely within the crankcase manifold, requiring no additional space.



NEW FORCE-FEED LUBRICATION SYSTEM—full pressure, positive lubrication, regardless of rotation. A new rotary oil pump, driven directly by the crankshaft, eliminates complicated and noisy gear trains. Oil is filtered through a strainer in the crankcase for protection of pump and other moving parts.

A.3.56

WORTHINGTON

CLIMATE ENGINEERS TO INDUSTRY, BUSINESS AND THE HOME

What's this about a Bank Fence and a Boiler?

A true story — with a moral for the boiler specifier

Now flourishing as the National Union Bank, the Union Bank of Kinderhook, N. Y., was founded in 1853, the year in which the H. B. Smith Company was established.

Six years later, H. B. Smith journeyed from Westfield to Kinderhook to lay before the Bank Directors a proposal: to furnish an elegant new cast iron fence to enclose the grounds of the banking building. Good salesman as always, H. B. came back with the order and the fence was speedily erected.

Today, visitors to Kinderhook are still impressed with the decorative appearance of this fence. Ninety-four years of constant exposure to all kinds of weather have done little to wear the sturdy gray iron castings from H. B. Smith's foundry.

Does this tale hold a moral for the boiler specifier? We think it does!

As used in H. B. Smith boilers, cast iron is an enduring material, highly resistant to corrosive acidic gases, and virtually indestructible except through human neglect or positive mistreatment. It has the qualities of controlled chemical uniformity, adaptability to intricate coring, and rapid and thorough heat absorption.

It is not unusual to find H. B. Smith boilers which have given uninterrupted service for 50 or 60 years and to which sections have been added as the need for greater heating loads has arisen. Thousands have been converted and reconverted to the use of various fuels as economy or supply made one or another more advisable. We know of one installation which has been in continuous use since 1884 — 70 years of service — with the only maintenance cost the replacement of grate bars, doors or other minor trim items.

Your customers are looking to you to provide a boiler with these qualities; you can recommend nothing better than an H. B. Smith.

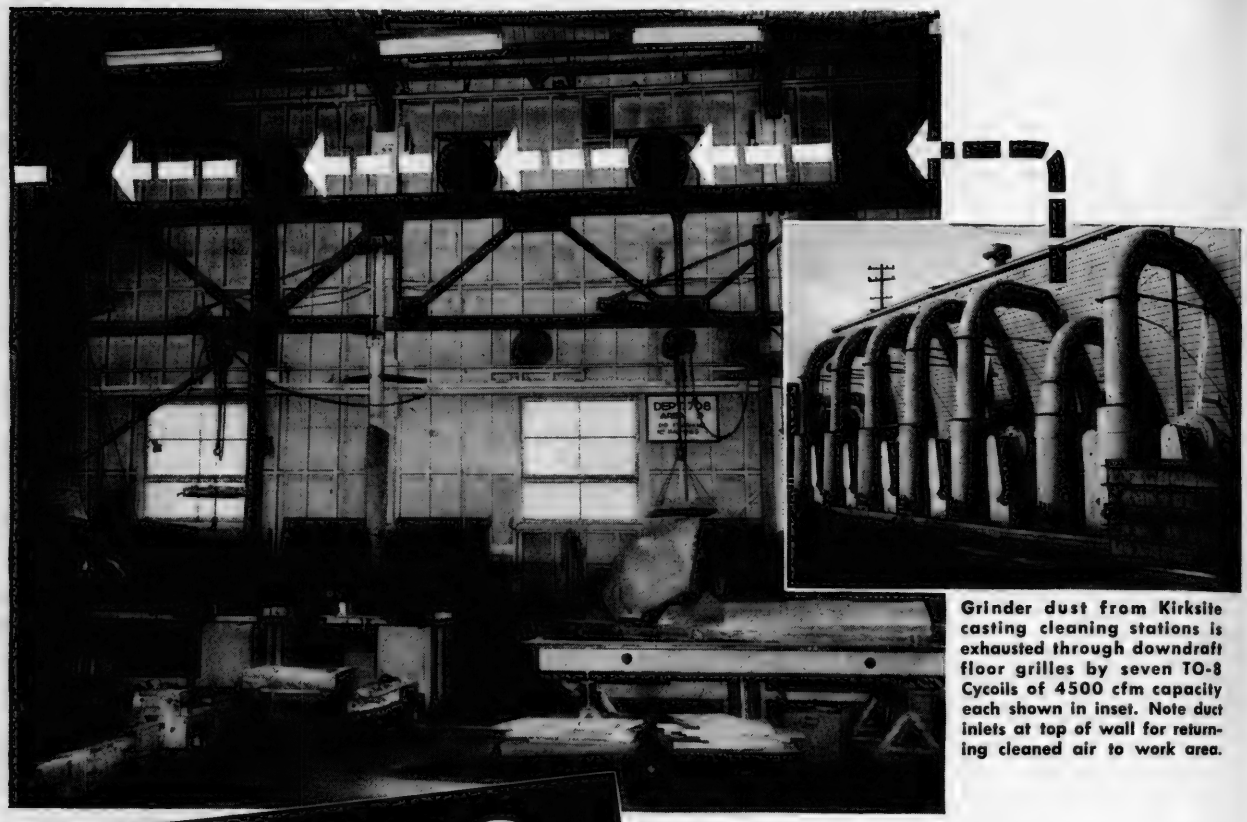
Note how more boiler heating surface and longer flue travel exact full benefit from fuel. Tall chimneys and induced draft mechanisms are not necessary with efficient Smith-Mills boilers.

World's Broadest Line of Cast Iron Boilers for Heating and Domestic Hot Water

H.B. Smith CAST IRON BOILERS

THE H. B. SMITH COMPANY, INC., WESTFIELD, MASSACHUSETTS

Established 1853



Grinder dust from Kirksite casting cleaning stations is exhausted through downdraft floor grilles by seven TO-8 Cycoils of 4500 cfm capacity each shown in inset. Note duct inlets at top of wall for returning cleaned air to work area.

CYCOILS REMOVE DUST and RETURN DOLLARS AT BOEING!

SEATTLE INSTALLATION Results in Clean Plant with Definite Heat Savings from Cleaned Air Return

Boeing Airplane Company, Seattle, Washington, scored a direct hit on dust with the application of Cycoil Air Cleaners to their Kirksite die finishing operations. It is apparent to the eye that they achieved their major objective—a clean plant. What you don't see are the cash dividends received in heat savings resulting from the return of cleaned air.

The TO-8 Cycoil is a specialist. This oil bath air cleaner is designed for handling the removal of the lighter dust concentrations common to so many metal working operations. Serving as a collector or after cleaner, Cycoil's unique triple cleaning action results in the high efficiency which permits recirculation of this cleaned air.

If you want to clean up dust and cut down heating costs, the TO-8 Cycoil deserves a prominent spot in your plant. For complete information on this and other AAF Dust Control Equipment, call your local AAF representative or write us direct.

American Air Filter
COMPANY, INC.
294 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

AAF

"TUNE IN [illegible] TH [illegible]"

illinois Selectotherm®

Investigate this modern development in automatically controlled heating!—a high vacuum steam heating system that assures the ultimate in comfort, economy and convenience.

A **SINGLE DIAL CONTROL** "tunes in with the weather" — mild or severe — balancing heat supply against heat loss to provide an even and constant warmth that is always exactly right.

Illinois Selectotherm Systems are ideal for schools, hospitals, churches, apartments, commercial and public buildings *of any size*. They may be installed in new buildings or applied to existing buildings where boilers are used for low pressure steam heating only—with any type of fuel and any form of mechanical firing device.

Learn how Selectotherm with its reduced fuel consumption will save 20% or more compared to an ordinary heating system!

illinois ENGINEERING

ILLINOIS ENGINEERING COMPANY

2035 SOUTH RACINE AVENUE • CHICAGO 8, ILLINOIS

DIVISION OF AMERICAN AIR FILTER COMPANY, INC.

Send today for your copy of the new Selectotherm bulletin that gives interesting engineering data.

Illinois Engineering Company
2045 South Racine Avenue, Chicago 8, Illinois

Send at once____copies of Illinois Selectotherm Bulletin 540 on Controlled Heating.

Name_____ Title_____

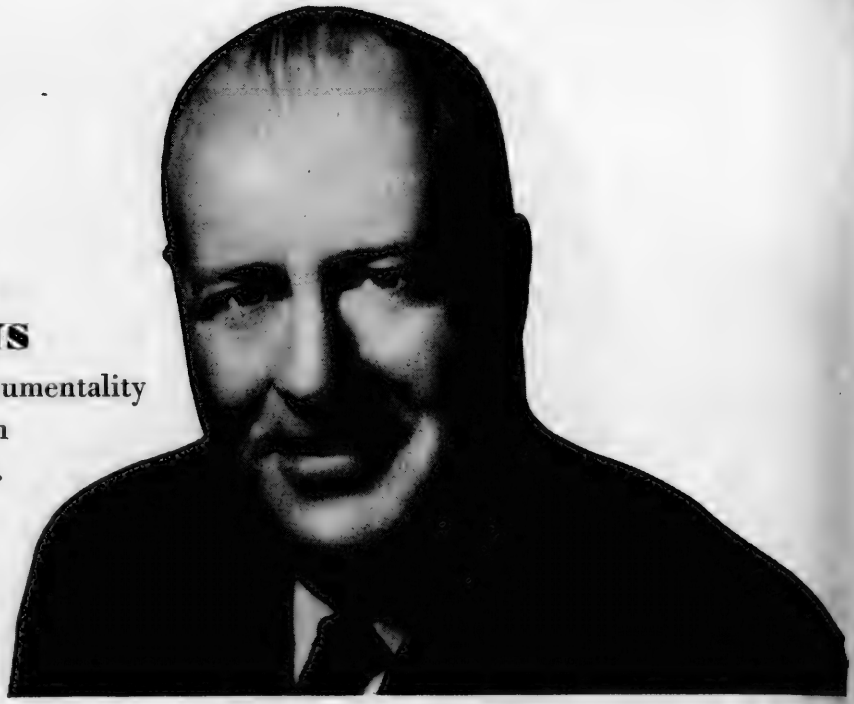
Company_____

Street_____

City_____ Zone____ State_____

"BUSINESS PUBLICATIONS

constitute our greatest instrumentality for adult business education and exchange of know-how. They are veritable textbooks for the sciences, businesses, industries and professions that they serve."



Lee H. Bristol, President, Bristol-Myers Company

Staying ahead of important developments is a must for all executives in business, in industry, in professions. As Mr. Bristol says, business publications are veritable textbooks. But, more than that, they are current revisions of the texts of essential businesses, industries and professions. Forecast shadows of the coming events on the business horizon are shown to American leaders in each issue of business publications. Specialized periodicals, often sharply focussed, cover many specific fields. No man in leadership, or in training for leadership, can afford to miss the regular reading of his business publications. That's why advertising pages of the Business Press make such a *direct route for anyone who has anything to sell to the buying factors in business, industry or the professions.*

NBP

The United Business Press

NATIONAL BUSINESS PUBLICATIONS, INC.

1001 FIFTEENTH STREET, N. W. • WASHINGTON 5, D. C. • STerling 3-7535

The national association of publishers of 162 technical, scientific, industrial and professional magazines, having a combined circulation of 3,524,478 . . . audited by either the Audit Bureau of Circulations or Business Publications Audit of Circulations, Inc. . . . serving and promoting the Business Press of America . . . bringing thousands of pages of specialized know-how and advertising to the men who make decisions in the businesses, industries, sciences and professions . . . pinpointing your audience in the market of your choice. Write for complete list of NBP publications.

You get

LOW INSTALLATION COST

When you get
B&W Welded Boiler Tubes

Uniform strength, wall thickness and diameter, together with high ductility and ease of rolling-in are assured when you specify B&W Welded Boiler Tubes. As these factors make tubing easier to install, you will have low installation cost.

For three-quarters of a century, B&W has been directly concerned with developing and applying boiler tubes for all pressures up to those approaching 3000 psi. The application of this extensive knowledge and experience results naturally in the production of finer welded boiler tubes.

If you want ease of fabrication and long service life for the tubing in your boiler—choose B&W Welded Boiler Tubes.

LOOK FOR THIS

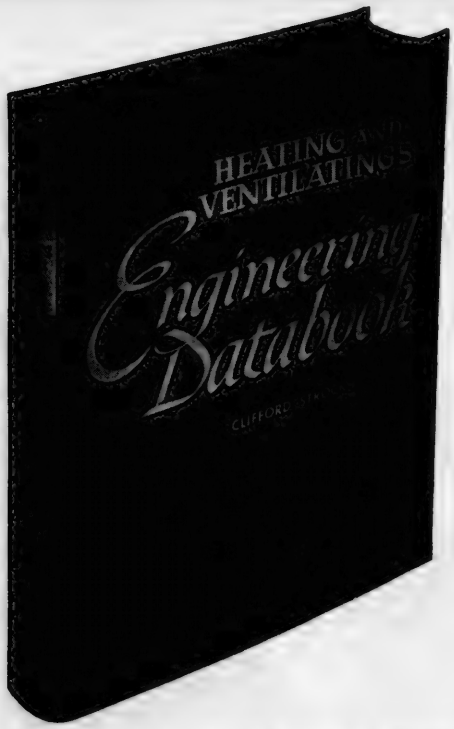
—wherever fine boilers are operating efficiently over extended periods.

To meet the specifications of time, say B&W before you say WELDED BOILER TUBES —for service-proved dependability.

B&W SEAMLESS and WELDED TUBES

THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION
Beaver Falls, Pa.—Seamless Tubing; Welded Stainless Steel Tubing
Alliance, Ohio—Welded Carbon Steel Tubing

TA-4034(CWP)



HEATING AND VENTILATING'S

Engineering Databook

HEATING AND VENTILATING'S Engineering Databook is an authoritative reference work, providing data on heating, ventilating and air conditioning for design, installation and operating engineers. Its 570 pages contain 317 essential tables, 193 charts and illustrations, and the 8 1/2" x 11" page size provides space for large-scale, easy-to-read charts, which eliminate or greatly simplify many everyday estimating and design problems. Subjects are grouped under the following eleven main divisions, which briefly illustrate the great variety of practical information in this valuable reference work:

- Heat and Moisture in Air
- Fuels and Combustion
- Piping — Sizing, Standards, etc.
- Air Handling and Ventilation
- Heating and Heat Transmission
- Cooling and Air Conditioning
- Motors — V-Belt Drives
- What the Contractor Should Know About Contracts
- Mathematical Tables
- Drafting Room Standards
- Terminology of the Industry

The Engineering Databook is filled with fundamental information, but its overall scope is considerably more than commonly used data. In addition, information is presented on the important subjects shown in the following list:

- The Heat Pump
- Electrothermal Storage
- Snow Melting
- Heating with Diesel Engines
- Attic Ventilation
- Heating Water by the Sun
- Radiant (Panel) Heating
- Basementless Buildings
- Axial Flow Fans
- Estimating for Air Conditioning Units
- Toxicity
- Law of Contracts

You will find use every day for the comprehensive, down-to-earth information in your Engineering Databook. Place your order now for this authoritative book. The coupon below — with free inspection offer in the U. S. — is for your convenience.

570 Pages

$7.00

510 Tables, Charts and Illustrations

Postpaid in U. S.
Use Handy Coupon Below

THE INDUSTRIAL PRESS, 148 Lafayette Street, New York 13, N. Y.

Please send me a copy of HEATING AND VENTILATING'S ENGINEERING DATABOOK under your 5-day free inspection plan. (Orders from Canada and overseas must be accompanied by payment in full, including $1.20 postage.) If I keep the book ☐ I agree to pay $7. in full within five days of receipt of book. ☐ I will send $2. within five days and pay balance $2.50 monthly. ☐ I enclose our firm's purchase order.

Name ..... Position .....

Company ..... Company Address .....

City ..... Postal Zone ..... State .....

*Home Address .....

*Please fill in if you want books sent to your home.

H&V-4/54

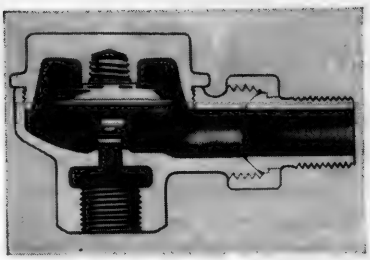
IT'S PROBABLY RIGHT ON THIS PAGE...

Every Steam Heating Specialty You Need is probably in the Dunham line, represented in the photo above. After all, Dunham's Specialties line is as complete as you'll find . . . *anywhere.* Every item has design features that mean better heating performance.

Dunham Radiator Traps, for instance, have an extra large, non-clogging valve seat opening—not restricted by a guide—that assures easy passage of air, water, foreign matter. Dunham's monel metal thermostatic disc has stop shoulder construction for easy individual calibration when servicing traps in the field, also allows thermostatic disc to be set at the factory to assure correct operation without field adjustments.

Sealed under high vacuum, Dunham's thermostatic disc assures positive response to temperature and pressure changes . . . *no bellows to clog or stick.* Disc corrugations distribute motion uniformly with minimum strain, no vibration.

For all the facts about Dunham Radiator Traps and other Heating Specialties, clip and mail the coupon.



Dunham No. 1E Radiator Trap in 3 sizes; 6 patterns; capacities from 200 to 700 EDR.

DUNHAM **HEATING SPECIALTIES**

RADIATION • UNIT HEATERS • PUMPS • SPECIALTIES

QUALITY FIRST FOR FIFTY YEARS

C. A. DUNHAM COMPANY • CHICAGO • TORONTO • LONDON

C. A. DUNHAM COMPANY
Dept. HV-4, 400 W. Madison St.
Chicago 6, Illinois

Send Heating Specialties Literature.

Name_____

Firm_____

Address_____

City_____ Zone____ State_____

"MADE TO ORDER"

THE IDEAL UNIT F

. . . air conditioning

***Compact design*—efficient trouble-free performance—The Skidmore "CV" Pump has long been a favorite in the heating pump field. NOW, this pump is winning new popularity, engineers and contractors are specifying the Skidmore "CV" Pump for industrial and commercial air conditioning installations. Requiring a maximum space of 15″ x 15″ x 22″ the "CV" Skidmore Pump is easy to install and economical to operate.**

Pump is bronze fitted throughout with enclosed centrifugal impeller. Shaft is stainless steel. Self lubricating bronze bearing directly above impeller insures proper alignment. Each pump is completely assembled and tested at factory. Call or write today for immediate shipment, or contact your Skidmore representative.

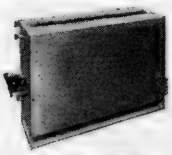
Skidmore Pumps have set a standard of performance and dependability through continual research and development since 1921.

SKIDMORE PUMPS

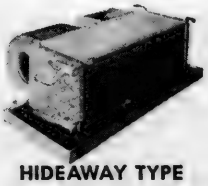
SKIDMORE CORPORATION • ST. JOSEPH, MICHIGAN

FLOOR TYPE
For free standing mounting beneath windows or along walls.

CEILING TYPE
For suspended mountings.



BASIC TYPE
For fully recessed installations, floor mounted.



HIDEAWAY TYPE
For fully recessed installations, ceiling mounted.

644 McQuay SEASONMAKER

insure tenant satisfaction at 430 Park Avenue, New York City

644 McQuay Basic Type Seasonmaker individual room air conditioners were installed in the beautiful new 430 Park Avenue office building in New York City to satisfy the demand for individual room comfort and control. The Seasonmaker's quiet operation and attractive design make it a welcome addition to any multi-room building.

The Seasonmaker's year 'round performance actually "makes the seasons come to you" . . . providing heated, and filtered air in winter; cooled, dehumidified, and filtered air in summer.

All Seasonmaker Air Conditioning Units have the famous McQuay Ripple-Fin coil construction assuring long life and dependable service. Available in Floor Type, Ceiling Type, Basic and Hideaway Types as illustrated above. For use with central systems circulating chilled or hot water or Freon. Easy to install and maintain in old buildings as well as new. Write for Condensed Bulletin 703. Representatives in principal cities.

ARCHITECTS:
Emery Roth & Sons, New York
BUILDERS:
Freeman & Gerla, New York
AIR CONDITIONING CONTRACTOR:
Mance Corporation, New York
MECHANICAL ENGINEER:
Mr. John Anselmo of Sears & Kopf, New York

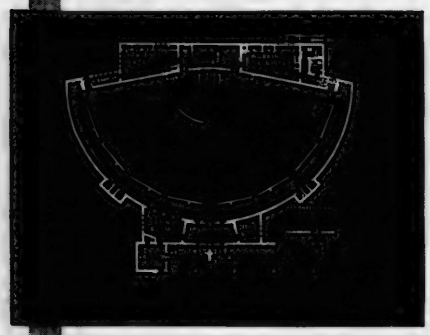
McQuay INC.

1619 Broadway St. N.E., Minneapolis, Minnesota

AIR CONDITIONING • REFRIGERATION • HEATING

PAUL THIRY'S *daring, functional design called for modern*

SARCOTHERM HEATING CONTROLS



Architect: **Paul Thiry**
Engineers: **The Austin Company**
Heating Contractors: **L. G. Massart Plumbing & Heating Co.**

CHURCH OF CHRIST THE KING, SEATTLE, WASH. Semi-circular arrangement seats 550 persons with no pew more than 50 feet from altar. Other features: 60-foot carillon tower; covered portico, stained glass clerestory.

TAKE ADVANTAGE OF SARCOTHERM'S UNUSUAL ENGINEERING SERVICE

In A Class By Itself—Sarcotherm's engineering service begins with the inception of the job, *carries through* every step of the way.

Complete Installation Drawings And Wiring Diagrams—not just general drawings but complete, tailor-made drawings and diagrams for each individual job.

On The Job Help—your contractor gets full cooperation and technical assistance backed by many years of specialized experience.

ARCHITECT PAUL THIRY'S inspiring design for Church of Christ The King is completely functional from its 60-foot carillon tower down to its weather modulated controls.

Radiant heating and the large attendance expected necessitated an extremely accurate, sensitive control system. To do the job, design engineers specified a Sarcotherm Weather Compensated Control System which insures comfort conditions inside regardless of outside temperatures.

Sarcotherm advantages of simple, low-cost, accurate control plus unique engineering service can help you design and install the most efficient system possible. A Sarcotherm engineer will be happy to advise you on your next project.

For full information on Sarcotherm controls, write for complete catalog.

SARCOTHERM CONTROLS, Inc.

Empire State Bldg., New York 1, N. Y.

An Affiliate of SARCO COMPANY, INC.

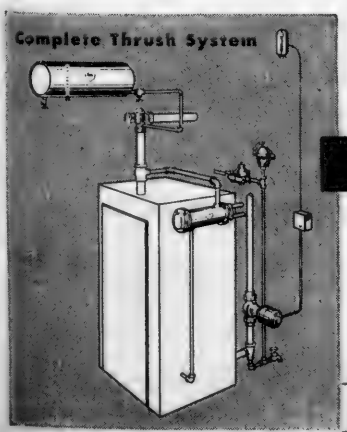
Weather Modulated Controls for **HOT WATER, RADIANT AND STEAM** *Heating Systems*

LOOK FOR THE Vacuum Breaker *

WHEN YOU BUY PRESSURE TANKS

SAVE TIME! Save labor! Reduce service bills! Please your customers. How? Just insist on genuine Thrush Pressure Tanks for the hot water heating installations you make. Only Thrush Pressure Tanks have the built-in Vacuum Breaker which enables you to drain a waterlogged tank completely in just a few minutes. Best of all, this feature costs no more!

This is only one of the many advantages you can give your customers and yourself when you install Thrush equipment. Ask your wholesaler about it or use the coupon below.



H. A. THRUSH & COMPANY

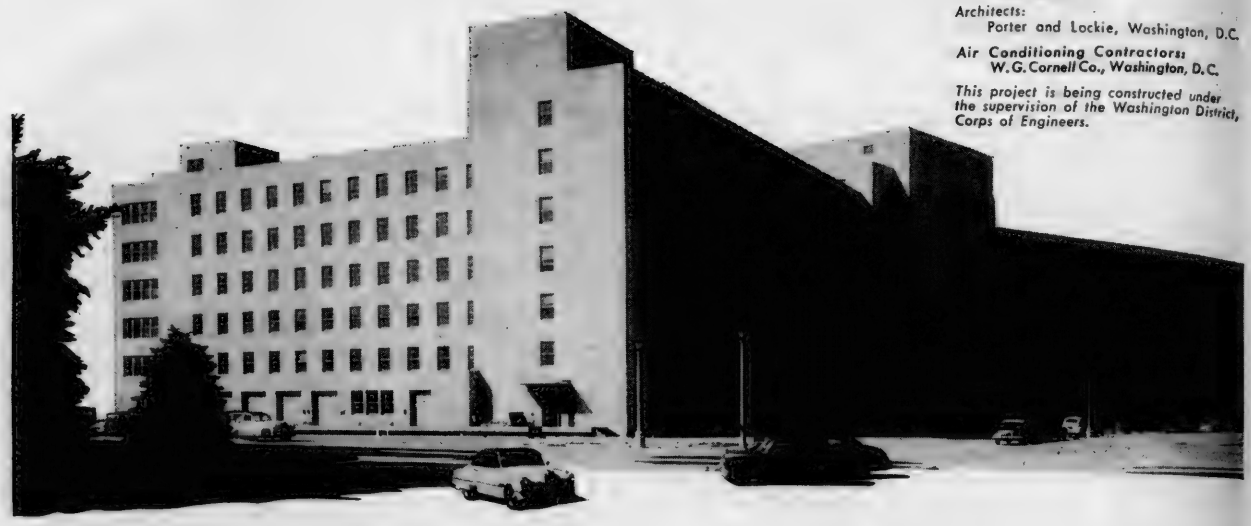
MAIL COUPON NOW FOR MORE INFORMATION

H. A. THRUSH & COMPANY
Department D-4, Peru, Indiana

Your built-in Vacuum Breaker feature of Thrush Pressure Tanks sounds valuable to us. Please send literature describing it.

NAME _____

ADDRESS _____

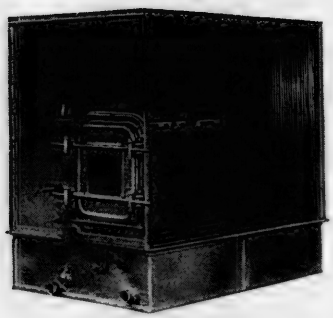


General Contractor:
George Hyman Construction Co., Washington, D.C.

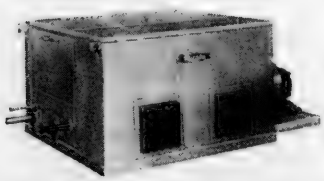
Architects:
Porter and Lockie, Washington, D.C.

Air Conditioning Contractors:
W. G. Cornell Co., Washington, D.C.

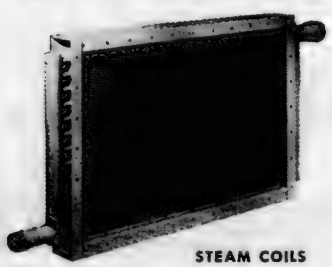
This project is being constructed under the supervision of the Washington District, Corps of Engineers.



SPRAY TYPE DEHUMIDIFIER



CEILING TYPE AIR CONDITIONING UNIT



STEAM COILS

Marlo EQUIPMENT

provides year-round air conditioned comfort in U. S. Soldier's Home Auditorium

Every facility for comfort and efficiency has been incorporated in the new Domiciliary Building of the U. S. Soldier's Home in Washington, D. C. . . . including complete year-round air conditioning in the auditorium.

Modern Marlo equipment, which serves so many buildings in the Washington area, was installed for this important comfort-conditioning job. Marlo air conditioning units, spray type dehumidifier, steam coils and pan humidifiers provide a pleasant living atmosphere for residents of this handsome structure.

Marlo equipment is designed to serve any air conditioning need . . . better!

FOR INFORMATION ON THE COMPLETE MARLO LINE, WRITE TO MARLO TODAY

Marlo COIL COMPANY

Manufacturers of COOLING TOWERS • EVAPORATIVE CONDENSERS • INDUSTRIAL COOLERS • AIR CONDITIONING UNITS • MULTI-ZONE UNITS • BLAST HEATING & COOLING COILS

Saint Louis 10, Missouri

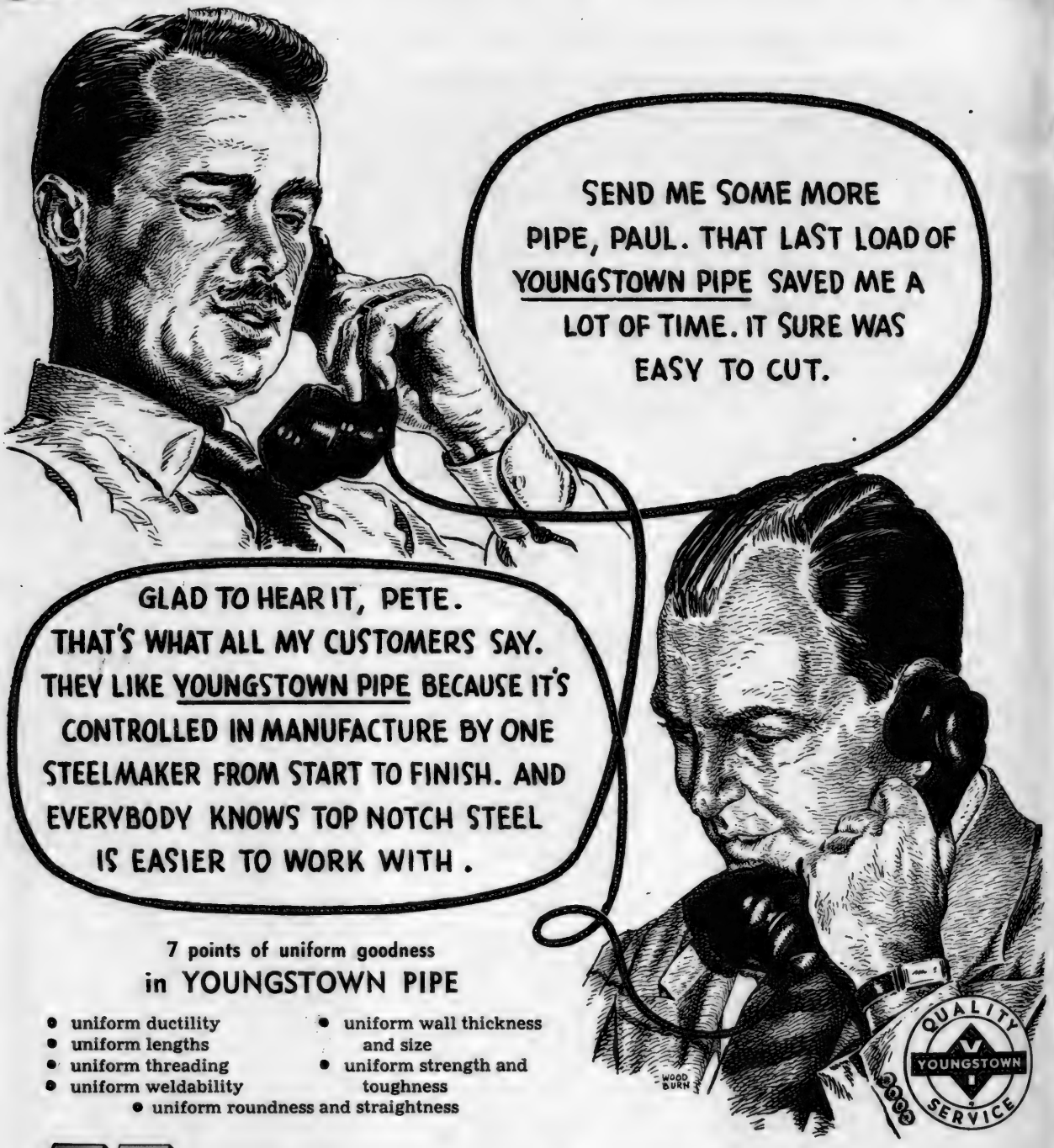
HOFFMAN STEAM TRAPS

FOR LOW, MEDIUM and HIGH PRESSURES

LOW PRESSURE TRAPS
MEDIUM PRESSURE TRAPS
HIGH PRESSURE TRAPS
Thermostat diaphragms are of a special alloy which will not soften or crack from repeated flexings.
Removable thermal units are a distinguishing feature of Hoffman Traps, greatly simplifying clean-out and inspection work.
STEAM

Hoffman offers a complete line of Low, Medium and High Pressure Thermostatic Traps with uniform guarantee of quality and precision workmanship. A full range of sizes and capacities assures you the correct trap for service with radiation, dryers, sterilizers, mangles, cookers and similar uses. Body, cap, nut and tail piece are of high quality brass. Other features of design contribute to long life, low maintenance cost Hoffman service.

Contractor calls for YOUNGSTOWN PIPE


SEND ME SOME MORE PIPE, PAUL. THAT LAST LOAD OF YOUNGSTOWN PIPE SAVED ME A LOT OF TIME. IT SURE WAS EASY TO CUT.
GLAD TO HEAR IT, PETE. THAT'S WHAT ALL MY CUSTOMERS SAY. THEY LIKE YOUNGSTOWN PIPE BECAUSE IT'S CONTROLLED IN MANUFACTURE BY ONE STEELMAKER FROM START TO FINISH. AND EVERYBODY KNOWS TOP NOTCH STEEL IS EASIER TO WORK WITH.
WOOD BURN
QUALITY
YOUNGSTOWN
SERVICE

7 points of uniform goodness
in YOUNGSTOWN PIPE

- uniform ductility
- uniform lengths
- uniform threading
- uniform weldability
- uniform wall thickness and size
- uniform strength and toughness
- uniform roundness and straightness

Youngstown STEEL PIPE

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices: Youngstown, Ohio - Export Office: 500 Fifth Avenue, New York 36, N. Y.

PIPE AND TUBULAR PRODUCTS - CONDUIT - BARS - RODS - COLD FINISHED CARBON AND ALLOY BARS - SHEETS - PLATES - WIRE - ELECTROLYTIC TIN PLATE - COKE TIN PLATE - RAILROAD TRACK SPIKES

Wall Closet fitting—
horizontal, single
type shown with con-
nection for soil pipe.

Syphon jet closet car-
rier face plate with
universal adjustable
fixture bolts and cor-
rosion resistant ad-
justable coupling.

ded view of Zurn
Closet Fitting for
jet closet left-hand,
natal, for soil pipe
tions. Also available
eaded pipe connec-

Zurn Horizontal Adjustable Wall Closet Fittings roughed-in in a large Chemical Plant

Pat. and Pat. Pend.

ZURN systems*

Simplify *Wall-Type Fixture Installations* and Usually Reduce Time-Cost

● A Zurn System includes everything except the pipe for installing wall-type toilets up to where the horizontal drainage line connects with the stack. Installations are above the floor, behind the toilets, behind the wall. There are no delays waiting for other crafts.

A Zurn System offers these plus features and advantages: *flexibility* which assures speed in assembly and accurate alignment in all three directions during installation; *rigid water-tight connections* insure minimum fina adjustments; *bulk of assembly can be prec in shop; unique waterway allowing a 4 vertical adjustment* does away wit numbered fittings.

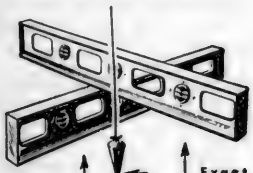
Zurn Systems are available for installin any type or make of wall-type toilet, urina lavatory, sink or other wall-type fixture Write for free booklet, "You Can Build and Maintain It for Less, A NEW WAY.

* T.M. Reg. U.S. Pat. O

THE ZURN WAY

PERFECT ALIGNMENT IN ALL 3 DIRECTIONS

Obtained with Exclusive Adjustment Features of Zurn Wall Closet Fittings And Carriers...For The Support of All Types And Makes of Wall Type Fixtures



Permanent horizontal alignment of each fixture with all others.

Vertical adjustment of fixture to any required height from the floor.

Exact adjustment of fixture at 90° to the wall.

Copyright 1954

PLUMBING DIVISION • J. A. ZURN MFG. CO. • ERIE, PA., U.S.A.

Sales Offices in all Principal Cities

In Canada: Canadian Zurn Engineering Ltd., Montreal, P. Q.

Other Divisions of the Zurn Organization

Marine Division: Fluid Control and Piping Equipment • *Industrial Division:* Strainers for Pipe Lin

Affiliate: American Flexible Coupling Co., Amerigear Couplings with Fully Crowned Teeth

ZURN PLUMBING DIVISION PRODUCTS INCLUDE EVERY-THING FOR DRAINAGE SYSTEMS FROM ROOF TO BASEMENT.

of several types of Engineered Carriers wall-type urinals.

Greaseptor.

Area Floor Drain.

Backwater Valve Non-fouling.

Roof Drain with Internal Expansion Joint; High Velocity Drainage.

Supremo Perfect Seal Floor Level Cleanout.

Over 700,000 Wall-Type Fixtures Now Installed with ZURN SYSTEMS in Buildings of Every Type From Coast to Coast. Write for list of buildings having rest rooms with fixture-bare floors.

J. A. ZURN MFG. CO.
PLUMBING DIVISION
ERIE, PA., U. S. A.

Please send me the new Zurn booklet, "You Can Build It and Maintain It For Less A NEW WAY".

Name and Title.....

Company.....

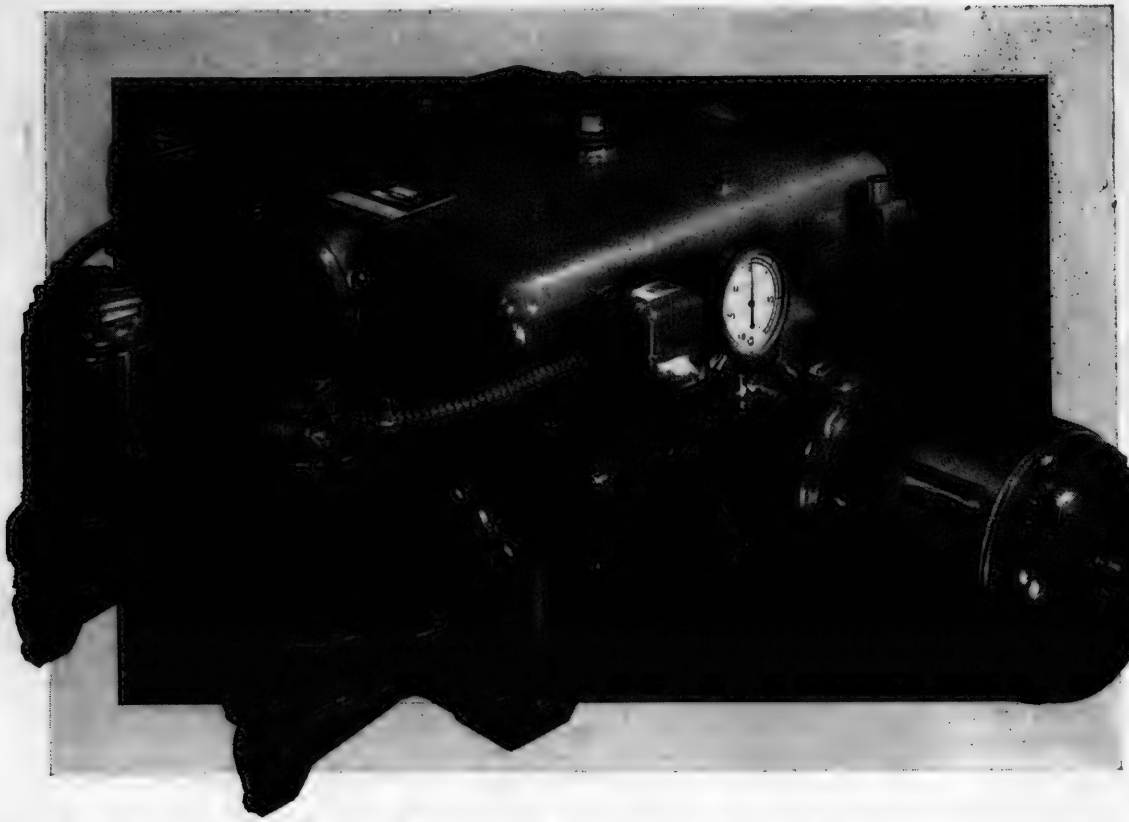
Street.....

City and State.....

Please attach coupon to your business letterhead.

Dept. HV-684

THIS NEW VACUUM HEATING PUMP IS SIZED TO ACTUAL JOB REQUIREMENTS



It's the Nash CSM

No longer is it necessary for the Engineer to accept a vacuum heating pump with air and water capacities based inflexibly upon square feet of equivalent direct radiation. With the flexible Nash CSM he can provide for proper air capacity in accordance with his judgment and experience. For the individual capacities of the separate pumps on the CSM may be varied within a wide range, without buying an oversize receiver and oversize water pumps.

These pumps possess many other features which permit a more efficient utilization of fuel and minimum use of electric power. Low, low, returns reduce installation costs and usually eliminate putting the pump in a pit. Simplicity and efficient operation reduce supervision and maintenance costs. Information regarding this new heating pump development is available immediately upon request.

- Increased air capacity induces rapid system response without wasteful overheating.
- Separate air and water pumps individually selected to meet actual job requirements.
- Control system that operates individual pumps only when needed.
- Flexibility permitting addition of radiation without changing basic pump installation.
- Low, low, return line connection.

NASH ENGINEERING COMPANY
438 WILSON, SO. NORWALK, CONN.

Motors for Refrigerating Plants

D. H. RUARK
Assistant Sales Manager
The Ideal Electric and Manufacturing Company, Mansfield, O.

In refrigerating plants, motors are used to drive a wide variety of equipment. By illustrations and descriptions, the author covers the many types of motors for this service and he presents data to help in proper motor selection and to achieve long motor life.

THERE is a right motor for every job. Motors in refrigerating plants are used to drive compressors, fans, blowers, pumps, conveyors and similar units. Where the motors are properly selected for such equipment, many operating and maintenance problems are eliminated for improper selection can lead to serious and costly operating conditions.

Both the equipment and motor manufacturers can, through their sales engineers, supply much valuable information. However, to obtain pertinent information and also to be able to use this data intelligently, it is necessary to have a general working knowledge of the equipment, the standards to which it is built, and what may be available.

The National Electrical Manufacturers Association, commonly referred to as NEMA, has established standards for the manufacture of most electrical equipment. Motor manufacture has been carried to a high degree of standardization, and since most manufacturers of electric motors belong to NEMA, motors are built to NEMA standards. This standardization is valuable to you because of the reliable information provided with each motor, and indicated on the nameplate. Standardization covers operating characteristics, starting conditions, duty cycle ratings, over-loads, high potential strength, allowable operating temperatures, selected horsepower ratings, standardized mounting dimensions, shaft sizes, starting currents and type of enclosures.

Since equipment has been standardized, motor users and suppliers can carry smaller stocks to meet emergencies and are able to use this equipment with the assurance that it will fit any standard make of motor. It is important, therefore, to become familiar with the NEMA standards covering the types of motors used in your industry. They are squirrel cage, wound rotor and synchronous motors.

Motor Characteristics

Integral horsepower ratings of polyphase, squirrel cage, wound rotor and synchronous motors have certain basic inherent characteristics and differences. For instance, a *squirrel cage motor* never runs at full synchronous speed. It is always a little less and as the load increases, the motor slows down slightly.

The *wound rotor motor* is a varying speed, adjustable speed motor. Motor speed will decrease slightly as the load is added, but in addition, speed may be adjusted by inserting resistance in the rotor circuit through its slip rings. Inserting this resistance also changes the motor starting torque, starting current and accelerating torque, as well as maximum torque. Both the squirrel cage and the wound rotor motors have an inherent lagging power factor, often termed low power factor. The power factor of each varies with the load placed on the motor, and it becomes increasingly lagging as the load is decreased. Both should be selected to operate at nearly full load at all times to keep up the power factor of the system. Low speed squirrel cage and wound rotor motors have very low power factors. Therefore, their use at low speeds should be avoided wherever possible.

The *synchronous motor* is a constant speed motor. It is normally built to operate at either 100% power factor or 80% leading power factor and is often selected to improve the plant or system power factor. Synchronous

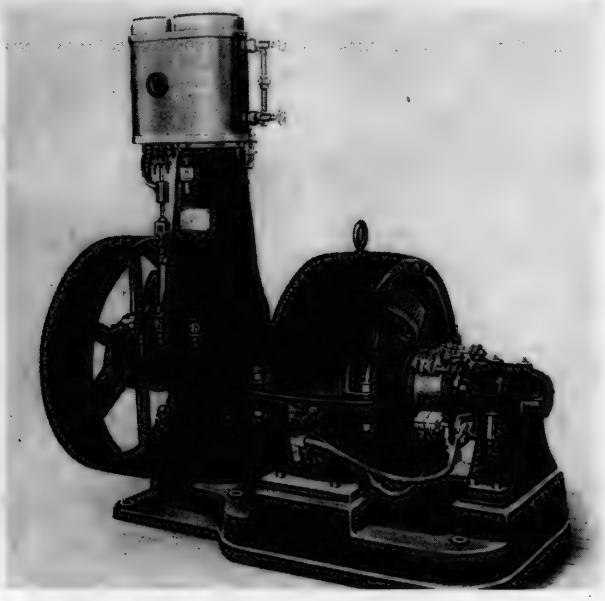


Fig. 1. Old type d-c generator direct coupled to a steam engine.

motors have better efficiencies at low speeds than do induction motors and, therefore, are normally selected for low speed applications such as direct coupled compressor drives.

Some of the inherent characteristics, obtainable in the three types of motors, which should be carefully studied are: Current drawn from the line, torque, response to load changes, effect on the system supplying energy, speed requirements, mechanical forms, type of bearings and temperature. The starting current of all electric motors is always larger than the full load current and it may vary from slightly more than full load to 6 or 7 times as much as full load current. It is necessary, then, to find out what the starting current is and what its effect will be on the system supplying the electrical energy. Will it cause objectionable light flicker? Will it lower the voltage momentarily enough to cause other motors already on the line to drop off because of under voltage protection? Will the full load current over-load the system, or a part of the system, to which it is to be connected? We shall also want to know what should be the starting torque, accelerating torque and maximum torque; in the case of synchronous motors, the pull-in torque. Pull-in torque is the torque required of the motor to accelerate the rotor and connected load to a speed from which the motor can synchronize when a d-c field is applied.

A power supply that will provide adequate voltage during the starting period is very important as the torque produced by a motor varies as the square of the voltages. For example, a 10 per cent reduction in voltage results in a 19 per cent reduction in torque.

Temperature is very important. The deterioration of the insulation materials used in motors increases at a rate which approximately doubles for each 8 to 12 degrees Centigrade increase in temperature over the standardized allowable limits. It is not advisable, therefore, to permit a motor to operate for any length of time at temperatures above those given on the motor nameplate. Accelerated deterioration of the insulating materials is not the only bad effect of excessive temperatures. Temperatures above the normal name plate rating may very often set up mechanical stresses and displacements of parts which cause progressive deterioration. For instance, excessive temperature may cause elongation of the shaft, which, in turn, may cause excessive thrust on the bearings. This may result in bearing failure or in shorter bearing life. Ambient air temperature should be carefully studied and a motor selected which will operate at a total temperature not to exceed the maximum standardized rating.

Insulation materials are divided into three classes known as Class *A*, Class *B*, and Class *H*. Class *A* is the least expensive and the most commonly used and, of course, must be operated at the lowest temperature. Class *B* is next, with Class *H* being the most expensive and capable of operating at the highest temperatures. Fortunately, Class *A* insulation is suitable for almost all applications in refrigeration plants.

Mechanical Features and Forms

Electric motors are available with many standard mechanical features and in many standard types of housings. Some of the most common types of enclosures are open, drip-proof, splash-proof, totally enclosed non-ventilated, totally enclosed fan cooled, explosion-proof, pipe ventilated and enclosed force ventilated. In the last five or six years, many improvements have been made in mechanical forms and features. General maintenance is easier, repairs can be made much quicker and with less expense.

Fig. 1 illustrates a very old d-c generator, direct coupled to a steam engine. It was built approximately 50 years ago and attention is directed to the very minimum of

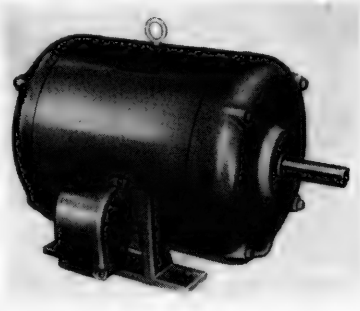


Fig. 2. Modern ball bearing squirrel cage motor with standardized mounting.

mechanical parts. There are just enough parts to form the electrical and magnetic circuits and to hold the various parts in place. Nothing has been added for mechanical protection of coils, electric wiring, or moving parts. This is a typical example of the early rotating equipment at

Fig. 3. Same type motor as Fig. 2, except with sleeve bearings.

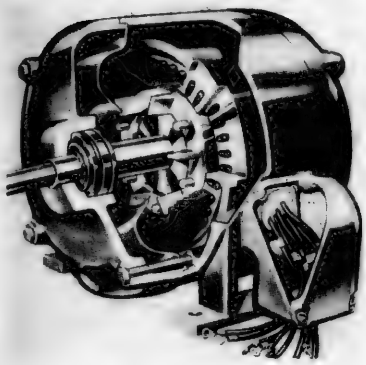


Fig. 4. Cutaway view of a ball bearing motor to show some of the motor details.

a time when motors and generators included only the essential operating parts.

A modern ball bearing squirrel cage motor, Fig. 2, built in a NEMA frame size, has standardized mounting dimensions. It is termed an open motor, but at first glance you could mistake it for an enclosed motor. It is actually a semi-enclosed motor. Notice there are no openings above the center line of the shaft and it has a clean smooth appearance. It is easy to wipe clean and the design provides protection to internal parts of the motor and to operating personnel. One working around this motor, while it is running, is not likely to come in contact with any internal moving parts, or any live wires.

This same type of motor, except with sleeve bearings, is shown in Fig. 3. The oil filler cups have been recessed in the bearing bracket as protection so that they will not be knocked off accidentally.

The cutaway view, Fig. 4, of the ball bearing motor illustrated in Figs. 2 and 3, makes it much easier to see the high degree to which mechanical protection of internal moving parts has been developed. It is not possible for a small object to roll or bounce along the floor and then enter the motor. It is even difficult to poke an object into the moving parts of this motor. The air baffle and the ventilating openings have been so arranged as to make this protection possible and still properly control the air flow to give maximum cooling with a minimum amount of air. In the older style open motors, natural radiation and ventilation was depended upon almost entirely for cooling. Later, fans were put on, but they were not too successful because in the very open design it was not possible to properly control the air flow as too much turbulence and recirculation took place. It was only after motors were more fully enclosed so that the air could properly be controlled that maximum benefit from forced air cooling was obtained.

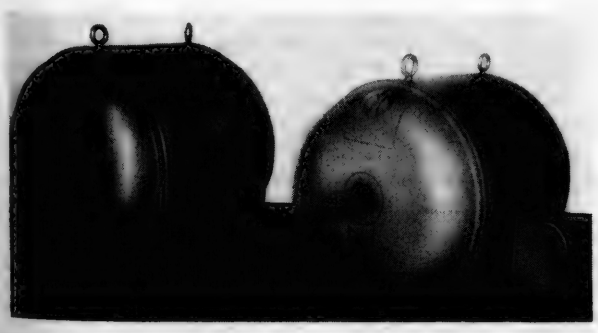


Fig. 5. Large high speed squirrel cage motors.

D. H. Ruark received his B.S. in Electrical Engineering from Purdue University in 1937. He served six years as manager of the Industrial Sales Division for the Ideal Electric and Manufacturing Company, three as electrical engineer for the Clark Manufacturing Company, Milwaukee, Wis., and then he returned to Ideal Electric as district manager of the Milwaukee office. Since 1949 he has served as assistant sales manager for that company.

The rotor of this motor has the windings, the end rings and the fan blades all cast of aluminum in one piece. Much heat is generated in the rotor windings during starting. Aluminum is a very good conductor of heat. Casting the windings, end rings, and the fan blades all in one piece provides a very efficient means of getting rid of this heat. It also gives a rotor circuit free of any welding or soldered joints and one which will stand the abuse of starting heavy loads repeatedly or carry shock loads over long periods of time.

The conduit box is split on an angle to provide a maximum of space for making connections. It is of cast aluminum with threaded conduit connections and is water tight. It can easily be turned to either side or straight up by removing four screws and replacing the conduit box in either of the four positions desired.

This motor is equipped with ball bearings which are of the prelubricated sealed type. For most operating conditions, this type of ball bearing does not require attention or relubricating more often than once every five years. Sleeve bearings in this type of motor are desirable for many shock load applications, for belt drive and for applications requiring special quiet operation.

Fig. 6. Motor with an easily removed cover for inspection of internal parts.

Two large high speed squirrel cage motors are pictured in Fig. 5. Motors 250 hp and larger are normally referred to as large motors and above 450 rpm as high speed. The construction, illustrated, is generally representative of the way large high speed motors are being built today. Large motors have not yet been standardized to the high degree achieved in the small motor. Standardized mounting dimensions have been proposed and were followed when these motors were redesigned. These motors are also well protected mechanically. They are enclosed almost as well as the smaller motor. This type construction is available in motors as large as 2,500 hp at 1,200 rpm and in squirrel cage, wound rotor and synchronous types.

Motors are provided with a hand hole cover as in Fig. 6. This cover is easily removed to provide a means for inspecting the oil ring operation and other internal parts

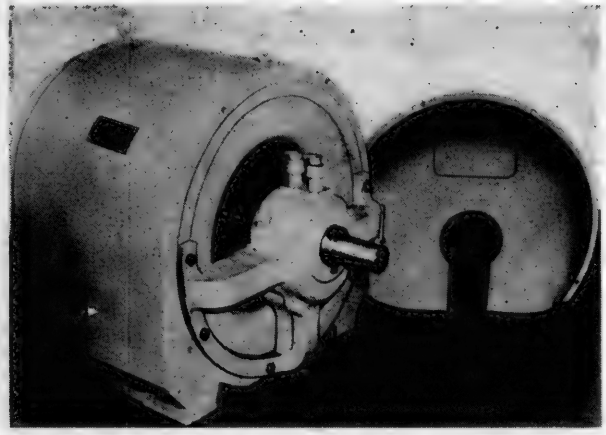


Fig. 7. End shield removed to show oil well filler.

of the motor, such as slip rings, brushes and brush-holders. Oil is also added to the sleeve bearings through this opening to reach oil well inspection and filler pipes shown in Fig. 7.

The oil well filler and inspection pipes, just mentioned, can be seen in Fig. 7 with the end shield removed from the motor. It is only necessary to take out four cap screws to lift off this protective cover. Many parts are now exposed and are arranged to give maximum access to parts which may need attention. The bearings are supported by a three-legged half bracket which leaves the top half of the motor entirely free of obstruction. These legs are heavy U-shaped cast iron and provide more than ample strength. An oil well sight gage is provided, visible from the side of the motor. The piping visible is used to connect this gage. The oil level of the bearing can be checked at a glance. The bearing housing is split and can be quickly and easily opened for inspection.

The bearing housing is shown open in Fig. 8 with the top half of the split bearing removed. This feature is one of the most important developments made in large electric motors in a number of years, for bearings are perhaps the most important part of the electric motor. They stand first in the list of causes of motor breakdowns, support the rapidly turning load carrying part of the motor and they take real punishment. Bearings are victims of poor foundations, misalignment, vibration, thrust, dirt, under-lubrication, over-lubrication and frequently use of the wrong lubricant. It is not surprising, therefore, that bearings are responsible for more shut-downs than any other part. When bearings fail, the rotor often rubs the stator and causes complete burn out of the stator winding or damage to the fan and stator or rotor core. This new split bearing, which received considerable design attention, can be quickly and easily inspected, and it can also be replaced easily with a new bearing. It is only necessary to support or raise the shaft ever so slightly to relieve pressure on the bottom half of the bearing, then roll it out and roll in a new one. All of the work can be done by one man with small standard tools and in a period not exceeding more than two hours. Neither the alignment of the equipment need be disturbed nor the bracket removed. It is not necessary to uncouple or remove a pulley. Previously, one had to disconnect the motor and to remove it from its foundation in order to take off the bracket and thus reach the bearings. This required, on a large motor, the services of two or more men, hoisting equipment and often as much as 8 to 16 hours time.

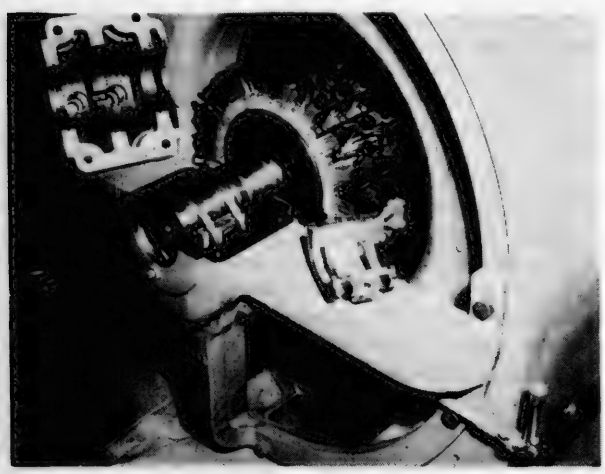


Fig. 8. Part of the bearing housing removed to show construction details.

Fig. 9. Ring and pipe design with felt seal can be used with bearing housings on many older style motors.

This bearing also has a built in vacuum break oil seal which effectively prevents oil vapor from being drawn out of the bearing housing into the motor and spread over the motor windings. There is an air passage cast into the bracket from the front side of the bearing housing leading to an opening which encircles the shaft at the back of the bearing housing. Air flowing around the bearing housing and into the motor causes a low pressure area to exist at a point where the shaft enters the bearing housing. This causes air to flow through the bearing oil seal from the bearing housing to the outside along the shaft. With the arrangement illustrated, oil-vapor-laden air is not drawn out of the bearing housing. The pressure difference is now between the air chamber and the outside, not the part containing oil. If the oil seals do become worn and oil does leak through, it leaks into this air chamber and is drained out to the outside of the bracket where it can be easily observed and give immediate warning that the oil seals are bad. They should be replaced at once.

A vacuum break oil seal, as applied to an old bearing, is show in Fig 9. This ring and pipe arrangement with felt seal can easily be made up and used on bearing housings of many older style motors, which were never equipped with vacuum break oil seal equipment. We have applied these to many bearings in the field with very

Fig. 10. Split air baffle of motor.

good results. The vacuum break oil seal attachment is removed to better show what it is like. It provides the necessary air chamber with a felt seal on the outside, and serves the same purpose as a vacuum break oil seal built into the bearing housing of new style motors.

The air baffle in the motor of Fig. 10 is split so that it may also be removed without disturbing the bearing bracket. With the air baffle removed, it is an easy matter to clean the coil end turns and inspect the general condition of the motor internally. It is important to keep the end turns of the stator windings clean, as a little dirt on these turns materially reduces the installation resistance. Two men with a little experience can remove the end shields and air baffles, inspect and clean this motor, replace the baffles and end shields and put it back in service in approximately one hour. The motor can, therefore, be inspected and cleaned more often and thereby kept in top operating condition much longer and at much less expense than formerly.

The brushholder assembly has been radically redesigned so that at present all of the brushes are mounted on the top half where their operation can be observed and the brushes can be easily replaced when worn out. The complete assembly can be easily removed for cleaning or complete replacement.

In recent years it has been necessary to build wound rotor motors at 1800 rpm in much larger horsepower ratings than previously. The reason for this is that they are normally used to drive a centrifugal type compressor where capacity reduction is required, as speed can be varied to control the output of the centrifugal compressor. Slip rings, as formally built, did not give satisfactory operation on these larger horsepowers at 1,800 rpm. They were too large in diameter and peripheral speeds were very high, which caused high friction loss, vibration, brush chattering and sparking. A new design provides slip rings which are much smaller in diameter. They are supported all the way around, not just in three points as formerly. This prevents distortion with changes in temperature. The assembly is compact, rugged and has been standardized to a point when the same assembly can be used from around 200 to 2,000 hp. The whole assembly can be built up, dynamically balanced and carried in stock available for quick installation as needed. The complete assembly can be pulled off the shaft and a complete new assembly pressed on in short order. Since it is a more rugged assembly than those used formerly, it should stand up much longer. Because of the smaller diameter rings and the arrangement of the brushholder and brushes, it is possible to mount them closer to the rotor, as they fit in under the stator coil extensions. The over-all length of a wound rotor motor using this type of slip ring and brushholder assembly is shorter and has a shorter, more rigid shaft.

The same type of frame construction is used for squirrel cage, wound rotor and synchronous motors. Previously illustrated are squirrel cage and wound rotor motors. In Fig. 11 is a synchronous motor with a direct connected exciter; all the features previously discussed have been incorporated in this motor.

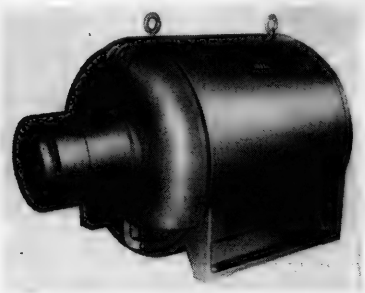
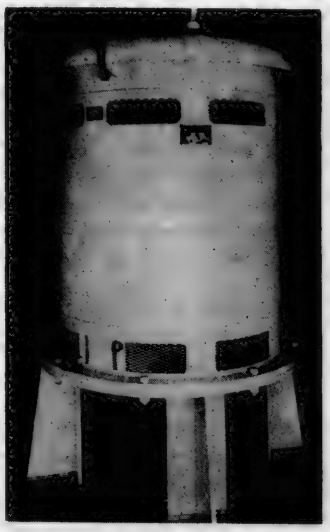


Fig. 11. Synchronous motor with direct connected exciter.

A synchronous motor, with the same type of general features, can have an aloft-mounted belt driven exciter. This type of exciter mounting can be used to advantage when the over-all length of the equipment must be minimized to conserve space.

Fig. 12. Vertical motor with drip cover, and wires to motor in conduit and conduit box.



The most common application for vertical motors is to drive vertical centrifugal pumps. In Fig. 12, notice the drip covers and the neat, smooth appearance. Wires carrying electric energy to this motor have been enclosed in conduit and a conduit box. As a comparison, a vertical motor built several years ago had an open, unprotected design. Wires supplying electrical energy were connected to the motor without conduit and conduit box. Such construction and installation promoted trouble, high maintenance costs and repair bills.

Small, totally-enclosed, fan-cooled squirrel cage motors, Fig. 13, are suitable for use out-of-doors, in wet or dirty locations, or where the motor needs the maximum of protection.

Larger totally enclosed fan cooled motors, page 83,

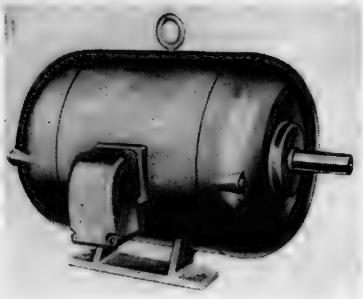
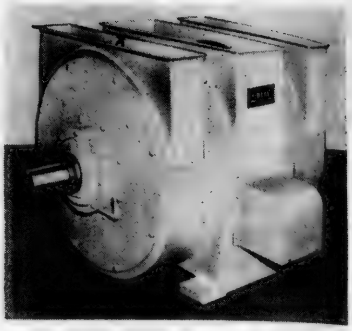


Fig. 13. Small, totally enclosed, fan-cooled squirrel cage motor.

Fig. 14. Motor with intake and exhaust openings pointing toward ceiling.



need more surface to dissipate heat. Tubes have been found to be very effective and they are easily cleaned by blowing out with compressed air or with a bottle brush on a long handle.

Pipe ventilated motors are less expensive than TEFC and are better for some applications. Intake and exhaust openings, Fig. 14, are arranged toward the ceiling for this particular motor. Motors are available with these openings designed to suit the job requirements. These motors are used where they must be protected from heat, from dirt, moisture, or where it is desirable to exhaust the warm air from the motor outside of the room in which the unit is operating. The openings are arranged for the attachment of duct work to bring air into the motor and to remove the heated air.

Small d-c generators are used for exciters on synchronous motors and, therefore, improvements on these machines should also be considered. An open type d-c exciter has been redesigned, and is now well protected. It has the same type of bearing brackets that are used on small a-c motors. A band around the frame closes up openings necessary for inspection, brush adjustment and replacement.

Former practice was to mount the brush rigging inside of a long bearing bracket and to support it from the bearing bracket. Anytime that it was necessary to remove the bracket to replace a bearing, all of the brush rigging and brush adjustment was disturbed. With the new arrangement, the brush rigging is supported from the generator frame and it is not necessary to disturb the rigging when the bracket is removed for bearing replacement or repair.

A good procedure and plan for a refrigeration engineer or operator to follow in selecting electric motors is to familiarize himself with NEMA standards applying to the types of motors he normally uses—such as squirrel cage, wound rotor and synchronous. Learn their basic inherent characteristics. A good motor application engineer should be consulted regarding the types of motors available for the job. Check carefully with him such points as motor loading, suitability of speed characteristics, starting torque, accelerating torque and time, pull-in torque and maximum torque, the starting current and its effect on the power supply, ambient temperature, and operating conditions at the location. Select the best type of motor enclosure to operate in these conditions. Make sure that the motor is properly installed on a good foundation with good alignment, that it is wired up with the right starter to give proper over-load protection and that the power supply will give an adequate voltage during the starting period. Then keep the motor clean and properly lubricated. When this has been done, one may expect long motor life with low operating and maintenance costs.

Industrial Air Conditioning is a Necessity

Once restricted to such specialized applications as textile and printing plants, industrial air conditioning is today a key contributing factor to the efficiency, health and safety of the production employee throughout industry, according to A. B. Waterbury, assistant chief engineer, Walter Kidde Constructors, engineers and builders.

"There are any number of popular-priced, mass-produced items presently on the market that owe their existence to the fact that, somewhere along the line, air conditioning played an important role in the manufacturing process," Mr. Waterbury said.

Industrial air conditioning can be used successfully to boost the production unit of output per man hour. However, the manner and extent to which it is applied to a specific industrial plant is largely dependent on the type of work. For instance, according to Mr. Waterbury, those who work seated at benches or at small machines, as in assembling small parts, inspecting finished parts or in packaging, require a larger amount of cooling in summer or heating in winter than employees who are on their feet or move about.

It is recommended that for employees seated at tables or benches, average air conditioning during the summer should be about 80F and 50 per cent relative humidity.

One of the most common causes of accidents at production equipment—outside of sheer carelessness—is the drowsiness induced by repetitive hand movements. The fresh atmosphere created by air conditioning has sharply reduced accidents and careless operation and has even bettered production.

While high temperature and humidity are an integral part of some industrial processes, it has been found desirable to sacrifice these conditions somewhat, in order to obtain better personal comfort for employees. For instance, in the glass industry, it has been found good practice to install air cooled walls to absorb some of the radiant heat.

When volatile solvent vapors are handled, air conditioning is a necessity from the safety viewpoint.

Efficiency Studies of Three Wet-Type Dust Collectors

BERNARD D. BLOOMFIELD

Ventilation Engineer, Division of Occupational Health, Michigan Department of Health, Lansing, Mich.

In response to public inquiry, an effort has been made by the Division of Occupational Health, Michigan Department of Health, to evaluate the performance of dust collection equipment in actual use. Recently, studies of three wet-type collectors were completed as one part of the program, and inasmuch as the principle of operation of each is based on varying degrees of centrifugal force and wetting action, the results of all three studies are reported in this one presentation. It is not intended that a comparison of performance data be made inasmuch as several factors make such a comparison technically unsound.

AIR SAMPLES were collected simultaneously at both the inlet and outlet duct work during industrial operation of three wet-type centrifugal collectors and were subsequently counted, particle-sized, and weighed in order to determine the performance characteristics of the collection equipment. The materials collected emanate from different industrial operations and have different physical characteristics. Also the inlet loadings and air flow rates are significantly dissimilar. *Therefore, no comparison of performance of one collector with that of another would be valid.*

Results, Collector A

The unit shown in Figs. 1 and 2 is used in a large production type grey iron foundry where automobile cylinder blocks and other automobile parts are cast. An extensive series of sand handling operations which are located in the basement directly under the shake-out area are hooded and exhausted through the collector to the outside. None of the air is recirculated back into the work room.

The manufacturer describes the unit as a wet dynamic dust collector which separates the dust from the air by centrifugal action, while the water wets and entraps the dust. The interior of the unit is described as a stationary screw within a horizontal, pear-shaped barrel.

The dust laden air enters at one end of the barrel under the suction of an exhaust fan connected to the outlet at the opposite end. During its flow within the barrel, the dust is continually centrifuged through four revolutions along a helical path formed by the screw. The lower portion of a horizontal barrel contains water and the surface of the water is swept by the air stream. The angular impingement and the friction of the air against the surface of the water induces a sheet of water to flow around the periphery of the barrel.

TABLE 1.—PERFORMANCE DATA, COLLECTOR A

Process	Foundry sand handling equipment, basement
Flow rate	20,205 cfm at 70F
Dust loading, inlet	0.09-0.34 grains per cu ft
Dust loading, outlet	0.01-0.03 grains per cu ft
Dust count, inlet	146-324 million particles per cu ft
Dust count, outlet	28-34 million particles per cu ft
Resistance	4.6 inches w.g.
Particle size, inlet	1.6 microns
Particle size, outlet	0.9 microns
Efficiency, weight basis	89-91%
Average	89%
Efficiency, dust count basis	79-90%
Average	85%
Cost of installation, initial	$12,900
Cost per cfm	$0.64
Cfm per horsepower	833
Time collector in operation	2.5 months

The collector studied is not provided with a skimmer type pre-cleaner as are certain other models of the same manufacture and all of the dust is collected wet and eventually removed in the form of sludge. The unit has a capacity ranging from 19,000 to 25,000 cfm and test results indicated a flow rate of 20,300 cfm. As is shown in Tables 1 and 2, the dust loading at the inlet averaged 0.18 grains per cubic foot. The dust loading at the outlet averaged 0.04 grains per cubic foot with a resulting collection efficiency on a total weight basis of 89%. The dust counts averaged 230 million particles per cubic foot of air at the inlet and 31 million particles per cubic foot

Fig. 1. Collector A installation in a gray iron foundry.

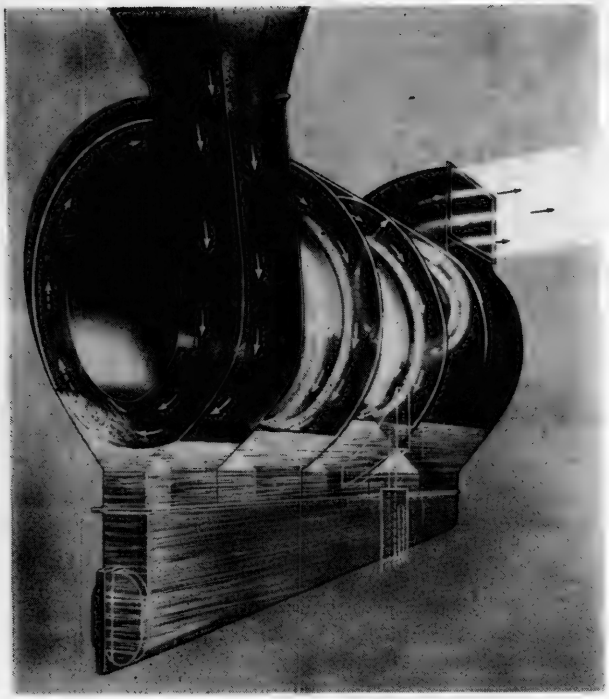


Fig. 2. Cut-away section of collector A.

of air at the outlet with a collection efficiency of 85% on a dust count basis. The particle size determination indicated a geometric mean of 1.6 microns at the inlet and 0.9 microns at the outlet and the collector resistance as determined by static pressure readings was 4.6 inches w.g.

All of the duct work used in the foundry basement exhaust system was fabricated on the job by the plant maintenance crew who also installed the collector. Initial cost of the installation amounted to $12,900, as itemized in Table 3. Based on the volume of air exhausted and motor horsepower, this initial cost amounted to 64 cents per cfm with 833 cfm being exhausted per collector horsepower, based on blower efficiency of 60%. The collector was put in operation 2½ months before the date of the study.

TABLE 2.—CHARACTERISTICS AND EFFICIENCIES, COLLECTOR A

Sample No.	Sampling Time, Minutes	Total Weight, Grains per Cu Ft	Efficiency on Weight Basis, %	Dust Count, Millions per Cu Ft	Efficiency on Count Basis, %	Mean Particle Size, Microns
Inlet—1	5	0.09	89	146	79	1.8
Outlet—1	5	0.01		30		0.9
Inlet—2	8	0.34	91	324	90	1.4
Outlet—2	8	0.03		34		0.9
Inlet—3	10	0.10	90	219	87	1.5
Outlet—3	10	0.01		28		1.0

TABLE 3.—INITIAL COST OF INSTALLATION, COLLECTOR A

Collector	$4,570
Support	100
Blower	1,230
Drive (V-belt)	500
Motor (60 H.P.)	1,200
Starter	500
Duct Work (including labor)	4,300
Wiring and Piping	500
Total	$12,900

Bernard D. Bloomfield received his Bachelor's degree in chemical engineering from City College of New York in 1944 and a Master's degree in industrial hygiene engineering from Harvard University in 1949. He has been on the staff of the Michigan Department of Health, Division of Occupational Health since 1945, when he began serving as a field engineer. He was later promoted to district engineer and is now serving as consulting engineer in the fields of industrial ventilation and air pollution.

Results, Collector B

Collector B was being used in conjunction with an asphalt plant exhaust system. An extensive local exhaust system was used for controlling all of the dust producing operations including rotary drying, screening, mixing and conveying. The dust laden air was then exhausted through a skimmer type pre-cleaner and the collector to the outside.

The ventilation section of this Division was requested by plant management to design a complete local exhaust system for all of their operations and also to supply them with a source list of suitable collectors. A previously installed local exhaust system had deteriorated to the point of uselessness and a high pressure water spray system used for cleaning the air exhausted from the rotary dryer only was undersized and ineffective.

Fig. 3. Simultaneous sampling of inlet and outlet ducts of collector B at asphalt plant.

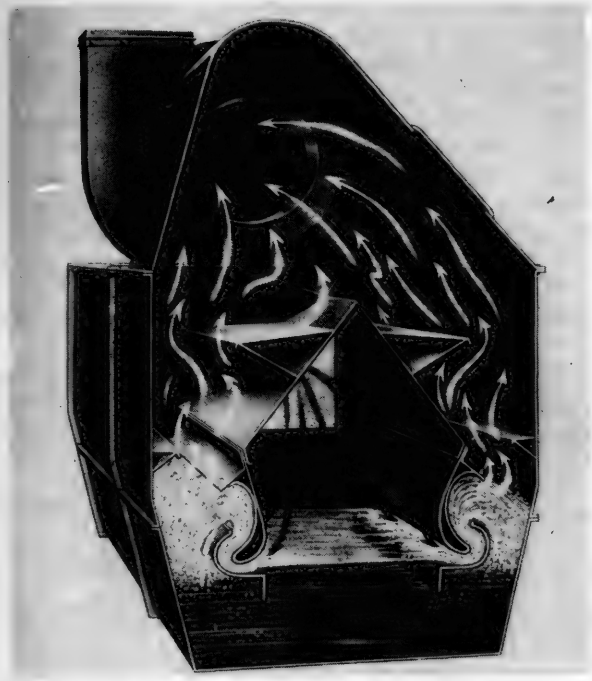


Fig. 4. Cut-away section of collector B.

A complete local exhaust system including drawings and specifications was submitted to management, put out for bid, and finally installed. Several months later Collector B was installed for cleaning the air. The actual collector and installation are illustrated in Figs. 3 and 4.

According to the manufacturer's literature and as is illustrated in Fig. 4, Collector B cleans the air by the combined action of centrifugal force and a thorough intermixing of water and dust-laden air. The dust is separated from the air by means of a water curtain, created by the induced flow of air through a stationary labyrinth. The lower opening of this labyrinth is partially submerged.

Air, flowing through the labyrinth at high velocity, carries the water with it in a heavy turbulent sheet along the inner surface of the lower baffle blade at such speed that it is projected across the passage and reverses direction to follow the curve of the upper blade from which it is ejected as a thick curtain that blankets the clean air chamber.

The air stream passes twice through this curtain of water and is in turbulent contact with the water as air and water move upward through the sinuous passage. The centrifugal force exerted by the rapid changes in direction of flow causes the dust particles to penetrate the water film and become permanently trapped. The manufacturer claims that, "This combined washing and scrubbing of the air produces such a thorough wetting action that high efficiencies are obtained with all types of dust, including many that are considered difficult or impossible to wet."

The asphalt plant, being located within 200 feet of a river, was able to utilize river water for collection and was adjusted for continuous flow of river water. The waste was continuously pumped back into the river so that no sludge removal tank was required. A skimmer pre-cleaner was used for the dry, centrifugal collection of the larger particles in the air stream thereby reclaiming a significant percentage of dry aggregate which was returned directly to the conveyor system.

As is shown in Tables 4 and 5, 31,500 cfm entered the collector with an average dust loading of 2.69 grains per cu ft. The dust loading in the outlet air was 0.15 grains per cu ft resulting in a collection efficiency based on total weight of 95%. On the basis of dust counts which averaged 1,200 million particles per cu ft of air in the outlet, an efficiency of 89% was determined. Particle size determinations indicated a geometric mean of 2.0 microns at the inlet and 1.4 microns at the outlet and static pressure readings indicated a resistance of 7.25 inches w.g.

TABLE 4.—PERFORMANCE DATA, COLLECTOR B

Process	Asphalt manufacture—mixing, screening, weighing, drying and conveying.
Air flow rate	26,000 cfm at 70F. 31,500 cfm at operating temp.
Dust loading, inlet	2.20-3.02 grains per cu ft
Dust loading, outlet	0.08-0.20 grains per cu ft
Dust count, inlet	8,900-13,800 million particles per cu ft
Dust count, outlet	800-1,530 million particles per cu ft of air
Resistance	7.25 inches w.g.
Particle size, inlet	2.0 microns
Particle size, outlet	1.4 microns
Efficiency, weight basis	93-97%
Average	95%
Efficiency, dust count basis	86-92%
Average	89%
Cost of installation, initial	$18,500
Cost per cfm	$0.82
Cfm per horsepower	527
Time collector in operation	3 months

TABLE 5.—CHARACTERISTICS AND EFFICIENCIES, COLLECTOR B

Sample No.	Sampling Time, Minutes	Total Weight, Grains per Cu Ft	Efficiency on Weight Basis, %	Dust Count, Millions per Cu Ft	Efficiency on Count Basis, %	Mean Particle Size, Microns
Inlet-1	2	2.64	93	10,200	86	....
Outlet-1	2	0.20		1,390		....
Inlet-2	3	2.71	96	12,120	89	....
Outlet-2	3	0.12		1,280		....
Inlet-3	5	2.20	94	8,900	90	....
Outlet-3	5	0.14		895		....
Inlet-4	4	3.02	94	13,790	91	2.0
Outlet-4	4	0.18		1,290		1.4
Inlet-5	1	2.63	94	10,280	92	....
Outlet-5	1	0.17		800		....
Inlet-6	1	2.92	97	11,710	87	1.9
Outlet-6	1	0.08		1,528		1.4

TABLE 6.—INITIAL COST OF INSTALLATION COLLECTOR B

Collector	$10,000
Skimmer pre-cleaner	2,500
Support	100
Blower	1,500
Drive (V-belt)	500
Motor (75 H.P.)	1,250
Duct work (including labor)	1,500
Pump	350
Wiring and Piping	750
Total	$18,450

The initial cost of the installation, including duct work, as itemized in Table 6, was $18,500 or 82 cents per cfm. On the basis of the motor horsepower, 527 cfm was being exhausted per collector horsepower.

The installation of the collector had been completed three months before our study.

Performance, Collector C

We were requested by management to study the Collector C installation in order to determine whether the cleaned air could be recirculated back into the foundry work room. The collector was being used for cleaning air that was locally exhausted from a shake-out operation, an elevator boot, a sand muller and several conveyor belt transfer points.

The collection unit as illustrated in Fig. 5 is designed to handle intermediate to heavy dust concentrations. According to the manufacturer's literature, dust-, odor-, or fume-laden air enters the collector tangentially through a duct or ducts just above the cone and below the lowest, or vaneless, impingement plate. This gives the incoming air the initial rotary motion that is further induced by the curved vanes at each stage, causing the air to rise spirally as it is drawn upward.

The cone-shaped bottom serves as a wet cyclone, collecting the heavier particles as soon as they enter the tower and forming a vortex into which the fine particles are precipitated against the wetted surfaces.

The washing agent, usually water, is introduced at no head pressure above the center of the top impingement plate, gravity causing the water to flow downward against the upward flow of the rapidly rotating air current. The rotary motion of the ascending air sets up a similar motion in the descending water causing it to be cascaded evenly over the discs, vanes, shelves, and side walls of the discs and shelves in a finely divided water curtain, through which the air must pass. This combination of water curtain, spray and impingement action envelops the particles of dust rising with the air and carries them down into the cone and out of the collector.

The clean air, having been thoroughly washed by the turbulent scrubbing action given it in passing under and over the four sets of shelves and discs and between the vanes of the impingement plates, passes through the entrainment separator located at the top of the tower above the water inlet. Here the air is freed of any excess moisture which drips down into the top impingement plate where it merges with the incoming liquid.

As shown in Tables 7 and 8, a flow rate of 6,360 cfm at an operating temperature of 98F was determined in

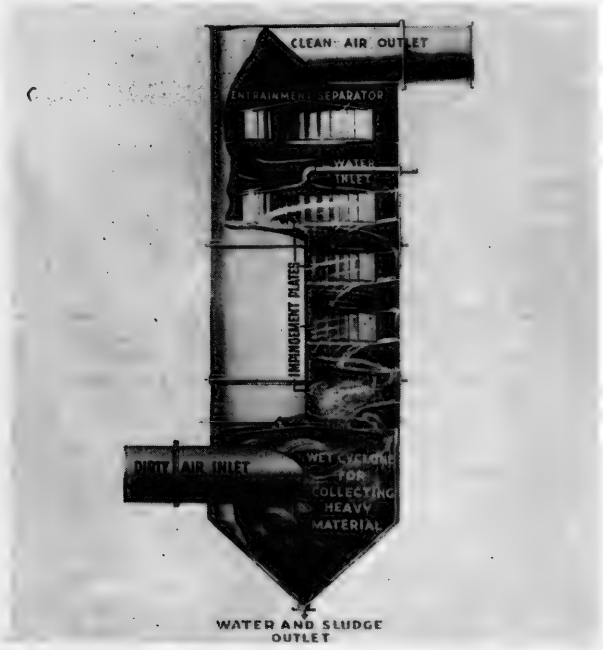


Fig. 5. Cut-away view of collector C.

TABLE 7.—PERFORMANCE DATA, COLLECTOR C

Process	Foundry shake-out, muller and conveyor transfer points.
Flow rate	6,050 cfm at 70F 6,360 cfm at operating temp.
Dust loading inlet	0.60-1.21 grains per cu ft
Dust loading outlet	0.01-0.03 grains per cu ft
Dust count, inlet	158-467 million particles per cu ft
Dust count, outlet	30-63 million particles per cu ft
Resistance	4.9 inches w.g.
Particle size, inlet	1.6 microns
Particle size, outlet	1.2 microns
Efficiency, weight basis	95-99%
Average	97%
Efficiency, dust count basis	84-92%
Average	87%
Cost of installation, initial	$7,210
Cost per cfm	$1.00
Cfm per horsepower	778
Time collector in operation	1 year

TABLE 8.—CHARACTERISTICS AND EFFICIENCIES, COLLECTOR C

Sample No.	Sampling Time, Minutes	Total Weight, Grains per Cu Ft	Efficiency on Weight Basis, %	Dust Count, Millions per Cu Ft	Efficiency on Count Basis, %	Mean Particle Size, Microns
Inlet-1	4¼	1.21	99	467	87	....
Outlet-1	4¼	0.01		60		....
Inlet-2	4	0.98	98	369	92	1.4
Outlet-2	4	0.02		30		1.2
Inlet-3	3	0.94	97	242	85	....
Outlet-3	3	0.03		37		....
Inlet-4	5	0.60	95	158	68[1]	1.7
Outlet-4	5	0.03		50		1.2
Inlet-5	3	0.92	97	405	84	....
Outlet-5	3	0.03		63		....

[1]Believed to be in error.

TABLE 9.—INITIAL COST OF INSTALLATION, COLLECTOR C

Collector	$2,240
Blower	440
Motor (15 hp)	340
Drive (V-belt)	70
Recirculating pump	580
Pump motor	160
Tank (500 gal. Schneible type LD)	1,030
Wiring and piping	750[1]
Duct work (including labor)	1,600[2]
Total	$7,210

[1]Estimated by author.
[2]Includes hoods and duct work in plant.

the collector inlet duct. The average loading at the collector inlet was 0.93 grains per cu ft whereas the loading at the outlet averaged 0.02 grains per cu ft, giving a collection efficiency based on total weight of 97%. The collection efficiency based on dust counts which averaged 328 million particles per cu ft at the inlet and 48 million particles per cu ft at the outlet, was 83%. Particle size determinations indicated a geometric mean of 1.6 microns at the inlet and 1.2 microns at the outlet. The initial cost of the installation including duct work, as itemized in Table 9, was $7,210 or about $1 per cfm exhausted. On the basis of the 15 hp motor used and 60% blower efficiency, 778 cfm were exhausted per collector horsepower. Static pressure readings taken before and after the collector indicated a resistance of 4.9 inches w.g. The unit had been in operation about one year prior to our study.

On the basis of indicated outlet dust concentrations ranging from 30 to 63 million particles per cubic foot with a collection efficiency of 83% on a dust count basis, recirculation of cleaned air back into the work room as a heat saving measure was not recommended. Instead, all the air going through the collector is being exhausted to the outside.

Study Procedure

The average duct velocity was first determined in both the inlet and outlet ducts using the standard ten point pitot tube traverse technique. Following the determination of duct velocities, samples were collected simultaneously and isokinetically at the inlet and outlet using the sampling method outlined in the A.S.M.E. Power Test Code 21 (1941), Test Code for Dust Separating Apparatus. Briefly, the method consists of aspirating at a velocity equal to the duct velocity the dust laden air at a measured rate through a nozzle facing directly into the air stream. The nozzle-probe apparatus used for duct sampling was connected directly to a Greenburg-Smith impinger and exhausted at the rate of one cubic foot of air per minute. Suction was provided with pumps previously calibrated to deliver the constant flow rate of one cubic foot of air per minute through the sampling equipment. At the completion of each sampling run, the nozzle-probe apparatus and the connecting rubber tubing were washed with distilled water into the proper impinger. This last step was necessary in order to free the particulate material which adhered to the inner walls of the sampling probe and connecting tube.

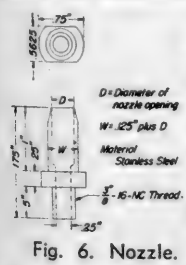


Fig. 6. Nozzle.

The use of the Greenburg-Smith impingers as a means of sample collection was advantageous in that the collected material suspended in water facilitated counting and particle sizing. Inasmuch as the impinger apparatus is designed to operate at a flow rate of 1 cfm, it was necessary to provide nozzles having a diameter which would enable sampling from the duct at a nozzle tip velocity approximately equal to the average duct velocity. Fig. 6 shows detail of the sampling nozzle, and Table 10 lists a representative nozzle series applicable to most testing studies.

TABLE 10.—NOZZLE SERIES

Nozzle No.	Diameter Inches	Drill Size	Velocity in fpm at 1 cfm
1	.2130	3	4042
A	.2210	2	3764
2	.2280	1	3528
3	.2380	B	3236
4	.2460	D	3030
5	.2570	F	2776
6	.2660	H	2591
7	.2770	J	2389
8	.2900	L	2180
9	.3020	N	2010
10	.3230	P	1757
11	.3390	R	1595
12	.3580	T	1430
13	.3770	V	1290
14	.3970	X	1163
15	.4375	7/16	958

Dust Count Method

The dust counts were made in accordance with the method outlined by J. J. Bloomfield and J. M. DallaValle in Public Health Bulletin No. 217, The Determination and Control of Industrial Dust, with some modification such as use of a Dunn dust count chamber and a quarter field micrometer disc.

Samples for particle sizing were plated out at the same time that the dust count samples were plated and were later sized using an oil immersion microscope technique and a filer micrometer. The plating procedure used for sizing the dust was in accordance with the technique described by W. E. McCormick in Public Health Reports, Vo. 61, No. 5, Feb., 1946, which utilizes a settling chamber (dust counting cell) and a thin microscope slide. The geometric mean of 200 particles was determined for each sample that was sized. The total weights were determined using standard laboratory techniques for this purpose.

The sampling crew usually consisted of three or four men. Two men were required for the simultaneous sampling at the inlet and outlet locations with additional help being required for timing the samples, adjusting the equipment, and assisting the individuals collecting the samples.

Discussion and Summary

Performance of all three collectors were acceptable in terms of atmospheric pollution standards. On the basis of contaminant toxicity, however, exhausted air was not suitable for return to the work room as a heat saving factor.

No attempt has been or should be made to directly compare the performance or cost of the three collectors solely on the basis of the data presented. Their performance characteristics have been reported in one place only because they are representative of wet collectors. The collectors discussed vary in capacity, size, and weight, and are handling materials having different physical characteristics with significantly different inlet concentrations. Also, each collector is representative of but one of several models marketed by the manufacturers for specific collection jobs.

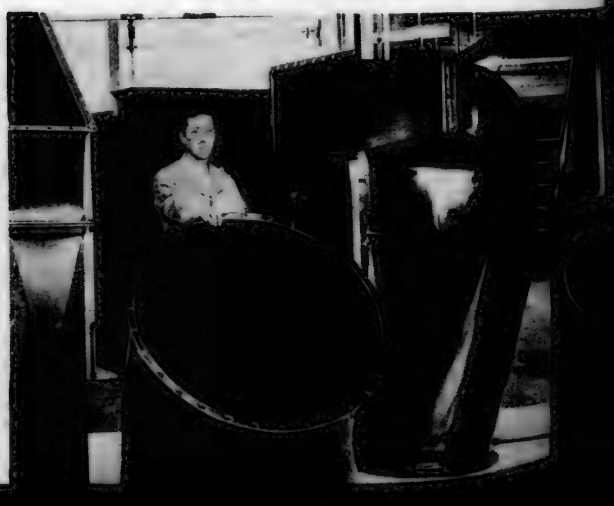
Sections of ¼-inch wrought iron plate are bent into cylinders (above) and welded end to end to fabricate the smoke stack shown at left. Stack is 95 feet high, erected at Lamb Electric Co., Kent, Ohio by Miami Boiler & Machine Co. of Akron.

Picture Paragraphs

(Left) Floriculturists of Cornell and Rutgers Universities in collaboration with Connor Engineering Corp. have developed a small air purification unit for refrigerated flower storage rooms. The unit, called the "Flower Saver," has two canisters filled with brominated carbon mounted on a blower. Ethylene gas, a product of plant metabolism which hastens aging of flowers, is absorbed by carbon, and flower life is lengthened.

(Left Below) Precision tolerances in the manufacture of ball and roller bearings are maintained at McGill Manufacturing Co., Valparaiso, Ind., by a new standards laboratory where temperature and humidity are closely controlled. Master measuring instruments are stored in the standards laboratory maintained within one degree of 72F. Shop gages are periodically calibrated by master instruments.

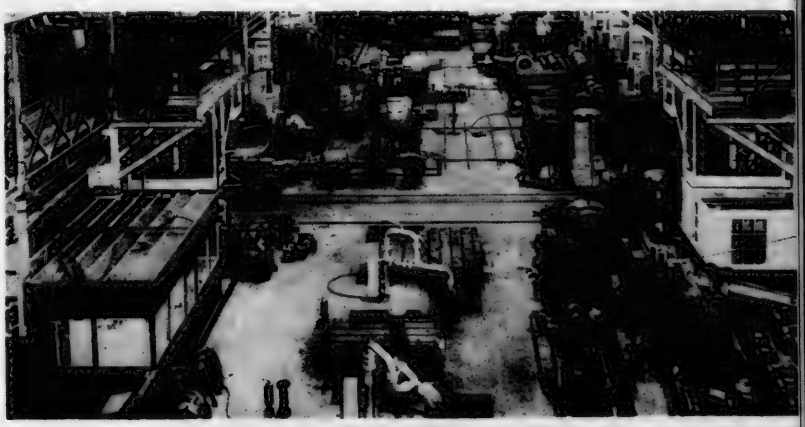
(Below) Large chemical processing equipment, including sections of duct work exposed to corrosive fumes, is given a tough, baked-on coat of Bakelite vinyl plastic to extend service life and cut maintenance costs.



(Above) Twelve thousand persons can be seated in a huge new dome-shaped building recently completed near the plant of R. G. LeTourneau, Inc., at Longview, Texas. Building is 85 feet high, 300 feet in diameter, and is constructed of aluminum and steel with no interior structural supports. Similar buildings made by LeTourneau can be erected anywhere in the world by shipping prepared metal parts to the site.

(Above) LeTourneau Semisphere covers 70,686 square feet of floor area and contains over 3,000,000 cubic feet of enclosed space. Completely erected, it will sell at less than $4.00 per square foot of space. The building is actually a segment of a sphere which, if complete, would have a radius of 173.2 feet. Steel center pole used in erecting the building may be removed or left up when the building is finished.

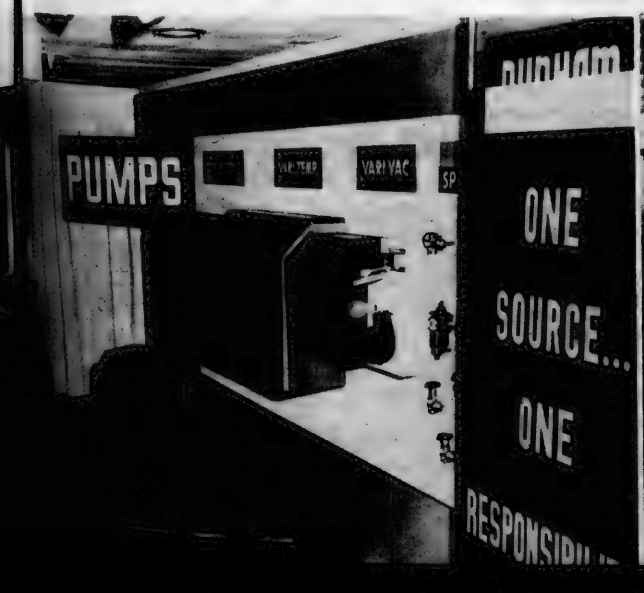
(Right) One of the world's largest hydraulic test laboratories has been completed and placed in operation at the Harrison, N. J. works of Worthington Corporation. Laboratory covers over 20,000 square feet and is designed for production or performance testing as well as for applied research and development of fluid handling machinery.



(Below) Steam and hot water heating equipment will be on display in a huge trailer set-up as a road show by C. A. Dunham Co., Chicago. Operating and cutaway models of equipment will go on a year-long nationwide tour. Trailer itself is heated by a Dunham gas-fired unit heater.

(Right) Newly designed heating system offered as an accessory on all 1954 Cadillacs uses two heaters which take air from cowl ventilator intake. Heated air is distributed through four defroster nozzles under windshield and two side ducts with outlets in lower sections of front doors.

(Below Right) Philadelphia's Mayor Joseph S. Clark, Jr., looks on as Edward G. Schreiber, president of the Greater Philadelphia Fuel Conference demonstrates cleanliness of anthracite which fired an automatic burner constantly in City Hall Courtyard during National Cleaner Air Week last October 18-24. Burner was provided by the manufacturer, Electric Furnace-Man, Inc., Emmaus, Pa.



Solar Heat Collectors Used With Heat Pumps

A study was made of the use of solar heat collectors in connection with the heat pump, by R. J. Jordan and J. L. Threlkeld of the Department of Mechanical Engineering, University of Minnesota. This is a condensation of their findings presented as a paper at the sixtieth annual ASHVE meeting.

CONSIDERABLE attention has been given to the problem of utilizing solar heat, not only for completely heating a house by this method, but as a system of heating that can be used as a booster with other systems, particularly the heat pump.

A large south-facing vertical collector is required for most sections of the country except in southerly latitudes where a south-facing tilted collector is advantageous. A solar heated house requires a large lot to accommodate

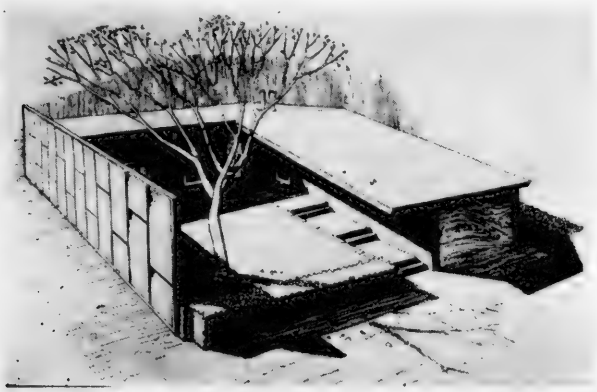


Fig. 1. Solar house with south-facing vertical collector.

the collector which (1) must be free from shading due to neighboring buildings and (2) so that those in nearby buildings will not be disturbed by reflections from the collector.

Although a number of solar house designs are possible, Fig. 1 illustrates a house with flat plate type, south-facing collector. The extension of the south-facing vertical collector forms one side of a court. Using this design, Table 1 lists the design heat loss for the house illustrated in Fig. 1, for four cities. Correspondingly, for the same house design in the same four cities, Table 2 gives a summary of calculations for collector area. In these tables, the following nomenclature is used:

A_c = surface area of collector, sq ft
q_{av} = January average rate of heat loss, Btu per hour
q_d = design rate of heat loss, Btu per hour
Q_{av} = January average rate of heat loss, Btu per day
$Q_{g,av}$ = January average rate of solar heat gain through window glass, Btu per day
$Q_{s,av}$ = January average rate of radiation incident upon a south-facing vertical surface, Btu per day, per sq ft
R = ratio of heat rejected to condense to heat absorbed in evaporator of heat pump, dimensionless
t_o = outdoor air design temperature, Fahrenheit
$t_{o,av}$ = January average outdoor air temperature, Fahrenheit
n_d = January average daily collector efficiency, dimensionless

The number of days of heat storage to be allowed is a matter of judgment. While Madison may need up to 17 days of heat storage, there is no assurance that there may not be years when greater storage is required.

The estimated volume of storage medium for the four

TABLE 1.—CALCULATED HEAT LOSSES FOR HOUSE OF FIG. 1

City	t_o, F	$t_{o,av}$ F	q_d Btu per Hr	q_{av} Btu per Hr
Madison	—15	18	65,000	40,000
Lincoln	—10	25	62,000	35,000
Nashville	0	40	53,000	23,000
New Orleans	20	55	35,000	10,500

Illustrations are from the paper or are redrawn from such material.

TABLE 2.—SUMMARY OF CALCULATIONS FOR COLLECTOR AREA

City	Q_{av} Btu per Day	$Q_{g,av}$ Btu per Day	$Q_{s,av}$ Btu per (Day) (Sq Ft)	n_d	A_c Sq Ft
Madison	960,000	79,900	960	0.59	1210
Lincoln	840,000	92,600	1220	0.67	715
Nashville	550,000	40,400	570	0.69	1010
New Orleans	250,000	54,800	810	0.83	226

TABLE 3.—ESTIMATED HEAT STORAGE REQUIREMENT FOR HOUSE OF FIG. 1

City	Million Btu	Volume Cu Ft*	
		Condenser Side	Evaporator Side
Madison	7.68	768	600
Lincoln	5.88	588	460
Nashville	6.05	605	470
New Orleans	2.00	200	156

*Based on heat capacity of 10,000 Btu per cu ft.

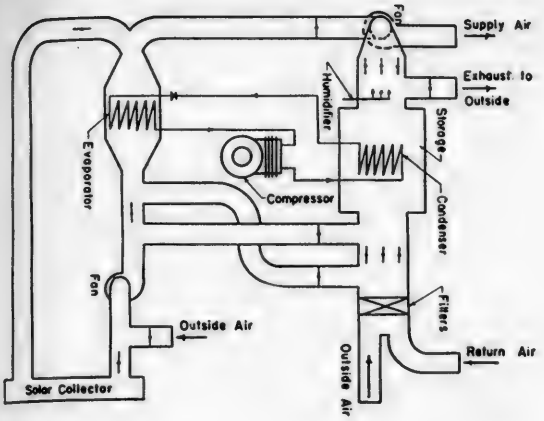


Fig. 2. Year-round air conditioning system using condenser side heat storage and single storage heat pump.

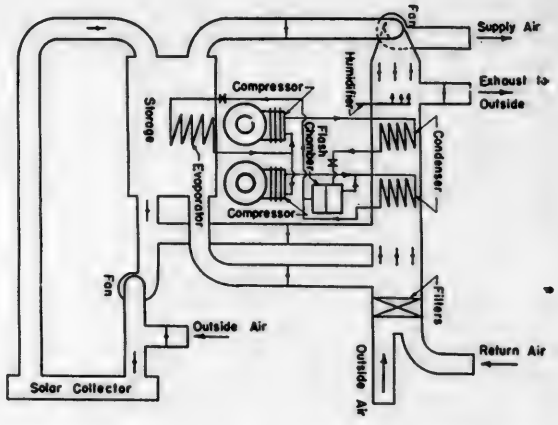


Fig. 3. Year-round air conditioning system using evaporator side heat storage and two-step condensation heat pump.

TABLE 4.—ESTIMATED HEATING COSTS FOR HOUSE OF FIG. 1 FOR THE HEAT PUMP AND FUEL-FIRED SYSTEMS FOR AN AVERAGE WINTER SEASON

City	Heat Required 10^6 Btu	Cost in Dollars		
		Heat Pump	Gas	Oil
Madison	126.5	94	162	199
Lincoln	106.0	78	72	135
Nashville	64.2	19	65	98
New Orleans	20.2	20	15	27

locations is listed in Table 3. The storage requirement in Btu was found by multiplying the number of January days of storage by the January average heat loss in Btu in Table 2. The evaporator side volume was found by dividing the condenser side volume by R = 1.28.

In Fig. 2 is shown schematically, a year-round air conditioning system using condenser-side storage and a single stage heat pump. In Fig. 3 is illustrated an evaporator side storage and a two-step condensation heat pump. Air is used in both systems as the transport medium and the duct dampers are set for winter operation. No auxiliary heat supply is shown but it could be placed on either side of the heat pump, preferably in the storage chamber.

Analyses are based on the assumption that the solar energy-heat pump system is capable of utilizing all radiation which can be collected during an average month of January. An hourly rate of radiation incident upon a south-facing vertical surface of 275 Btu per (hr) (sq ft) is typical of mid-day radiation during a cloudless January day in most parts of the country.

In a system equipped with evaporator-side storage, the heat pump must have a condenser capacity equal to the design heating load. A system using condenser-side storage requires equipment about five times larger than a system using evaporator-side storage. A two-step condensation heat pump requires somewhat smaller displacement and horsepower than a single stage heat pump.

A preferred condition with a higher coefficient of performance is a system with evaporator-side storage and a two-step condensation heat pump.

The estimation of heat storage required was based on an amount sufficient for most years but not enough for the worst years on record. Therefore, auxiliary heating will be required of sufficient capacity to provide the entire heat source for several consecutive days. The size of an auxiliary heating system for the evaporator side of the heat pump in Btu per hour for the home illustrated is for Madison, 31,000; Lincoln, 27,000; Nashville, 18,000; New Orleans, 8,200. It is desirable to supply the auxiliary heat to the storage medium.

The first cost of a conventional heat pump system is comparable to or less than the first cost of other types of year-round air conditioning, depending upon the expense of procuring the heat source.

Comparative Costs

Table 4 shows the estimated fuel and heat pump costs for an average winter season from October 1 to May 1 for the four localities. The heat pump was taken as a two-step condensation type operated at 115 upper condensing temperature, 90F lower condensing temperature, and 50F evaporating temperature. The heat pump costs shown are for electricity costs for the compressor only.

Any home in the United States may be heated entirely by a solar energy heat pump system if a sufficiently large collector, heat pump, and heat storage facilities are provided. It has been shown that at Lincoln, Neb., a locality

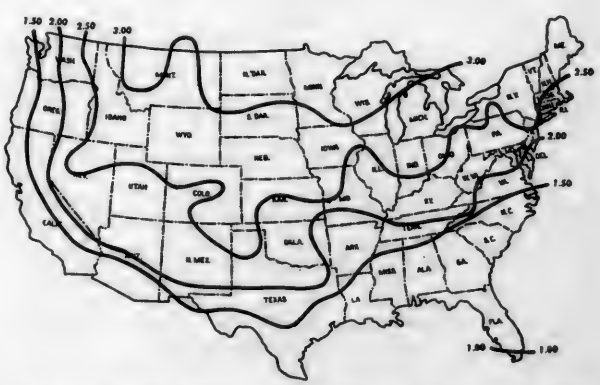


Fig. 4. Relative design heating load for the United States.

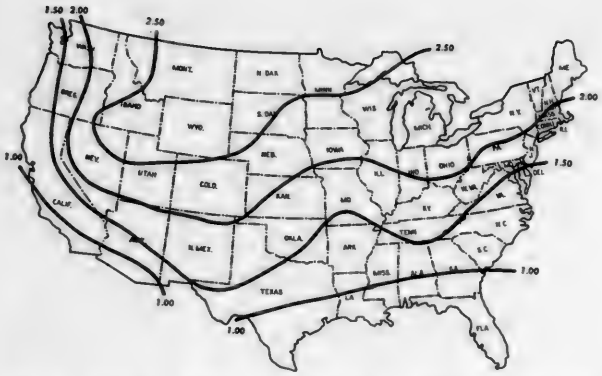


Fig. 5. Ratio of design heating load to design cooling load for the United States.

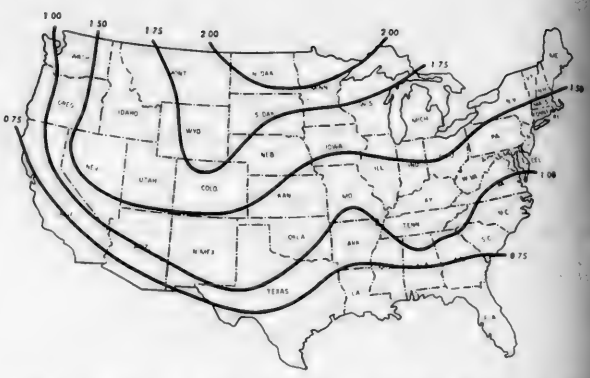


Fig. 6. Ratio of tons capacity for winter heating to tons capacity for summer cooling with no heat storage.

which has severe winters, a house with a design heating load of 62,000 Btu per hr may be heated during the average winter with a system equipped with 700 sq ft collector, a 4 hp heat pump and attainable heat of fusion type storage material requiring a volume equivalent to a small basement room. An auxiliary heating system of moderate size is required during the infrequent very cloudy winters. A solar energy heat pump system may result in heating operating costs substantially less than conventional fuel-fired systems.

Fig. 4 shows the relative design heating load for the country. The maximum rate calculated for a conventional type house was 3.38 at Duluth, Minn. In Fig. 5 is the ratio of design heating load to design cooling load. With the exception of a narrow belt of southern states and the extreme southwestern section, all regions of the country show a higher heating load than cooling load.

Fig. 6 shows the ratio of tons capacity for the refrigerating system (heat pump) that is required for winter heating to tons capacity required for summer cooling for systems with no heat storage. Assumed conditions for the heat pump were 120F condensing temperature and 40F evaporating temperature.

When the difference between the collector plate temperature and the daily average outdoor temperature is 50F or less, daily efficiencies during January of 60 per cent or more may be expected on clear days for a south facing vertical collector. Solar energy heat pump systems may operate with a much lower collector plate temperature than direct solar utilization systems resulting in substantially higher collector efficiencies and smaller required collector surface. A flat plate collector with a south-facing vertical orientation should be equipped with two glass panes in the northern part of the country and one glass pane in the southern part.

If solar energy is to contribute more than a token part of the space heating requirements, then a heat storage facility must be provided. Heat of fusion type storage materials appear superior to specific heat or latent heat of vaporation types. Also in systems using a heat pump, the heat storage facility should be placed on the evaporator side.

In many localities, solar energy heat pump systems would result in lower heating costs at the present time than conventional fuel-fired systems. At present, such systems would have a high first cost because of the need for custom building the solar energy system. However, with standardization of collectors and heat storage units, it would be possible to reduce these costs.

The main problem associated with the development of solar energy heat pump systems involve solar collectors and heat storage systems. No serious architectural problems appear to exist since a house may be designed to include a moderately large south-facing collector and yet retain architectural appeal and livable qualities equal to conventional homes. Solar energy heat pump systems appear feasible in a large part of the United States but further research and development are necessary before such systems may be adopted on a large scale for the services described.

Refrigeration Code Protects Apartment Dwellers

Apartment dwellers will be protected by the revised ASA that calls for the latest safety designs and features of mechanical refrigeration to provide "safeguards to life, limb, health and property." The standard also applies to refrigeration equipment used for air conditioning purposes.

The code not only applies to residences of more than two families, but also to all institutions, places of public assembly, commercial and industrial buildings and mixed occupancies, or buildings used for different purposes in various parts.

The revised code makes provisions for improvements in refrigeration since 1950, when the previous edition of the code was approved. It clarifies the requirements for mechanical refrigeration in all buildings, but does not apply to refrigerating systems in motor vehicles, trailers, on shipboard or trains.

The sections on piping and pressure vessels have been completely revised for maximum safety because of newly acquired knowledge in the field. Specifications for pressure relief devices have been expanded in the revision. New refrigerants, such as Carrene No. 7, have been recognized as giving safe, reliable service.

AIR CONDITIONING THE BEAUTY SHOP

John T. Dabbs
Sales Supervisor
York Corp., St. Louis, Mo.

Air Conditioning the Beauty Shop

JOHN T. DABBS

Sales Supervisor, York Corp., St. Louis, Mo.

Information is presented to give the engineer an understanding of the problems he has to face when designing a suitable air conditioning system, and the steps to follow when computing the air conditioning load.

BEAUTY shops range in size from the one staffed by a single operator to the large size shop which employs a number of operators and includes the sale of cosmetics. Since there are no standard types of sizes of such shop, each layout is different and is made to conform to the existing building space.

The usual beauty shop contains a number of booths equal to the number of beauty operators employed. The hair dryers are generally grouped in one location but there are instances where a dryer is located in each booth. It is common practice to have the number of dryers equal to the number of booths, with one or more in reserve. The arrangement of the booths depends largely upon the size and shape of the floor plan.

Ordinarily there is a reception space near the front entrance with the booths in the rear, arranged along one or both side walls. Fig. 1 illustrates a typical booth arrangement, together with location of dryers, reception space, and other service facilities.

Booths are usually about 6 ft wide x 7 ft deep. The booth partitions may vary in height from a low open type to a high enclosed type, the average partition being approximately 6½ ft high. Although the present trend is toward the low open booth, there are many of the older closed or semienclosed construction.

Photograph on page 99 by Ewing Galloway.

Fig. 1. A modern beauty salon, Courtesy Beauty Culture.

John T. Dabbs, a native of Mississippi, received his B.S. in M.E. from Mississippi State College in 1934. For the next two years he was operating engineer on ocean going steamships out of San Francisco, and from 1936 to 1939, sales engineer associated with the Los Angeles and Seattle offices of York Corp. He saw service with the U. S. Army in Alaska and the Philippine Islands from 1940 to 1946, and was discharged with the rank of Captain. From 1946 to the present, he has been with York Corp., and is now sales supervisor and engineer with the company's St. Louis office. He is a Missouri licensed professional engineer, and is a member of the National Association of Practical Refrigerating Engineers, and ASHVE.

The number of permanent wave machines will vary from shop to shop, but their use is diminishing. A shop using from four to six permanent wave machines five years ago might require no more than one or two today. This is due to the recent trend toward the use of cold wave preparations. It has also become common practice for women to apply their own permanent waves at home with the use of cold wave kits.

The beauty shop has, for the most part, only services to offer. The quality of service rendered will determine the volume of business that a particular shop will develop. Services offered include not only hairdressing, hair styling, shampooing, permanent waving, manicuring and facials, but also customer comfort, during both waiting time and the time the customer is being served.

The beauty shop normally experiences sharp seasonal fluctuations in volume of business. During the months of January, Eebruary and March the business volume is usually low. The business peak is reached from Easter to June, and then may fall off as much as 50 per cent during June, July, August and September. During these months, it becomes necessary for a beauty shop owner to reduce his personnel. Because of this fluctuation in business, only 50 to 60 per cent of a beauty shop's operators are permanently employed, making it almost impossible to obtain experienced and efficient operators for the periods of maximum business volume.

It is apparent, therefore, that it is profitable to the beauty shop owner to take advantages of the special inducement air conditioning offers to bring in more business during the summer season. With a more even business volume, the beauty shop owner is able to develop a staff of efficient and permanently employed operators, promoting greater customer satisfaction than would otherwise be possible.

Reports from owners of air conditioned beauty shops are almost unanimous in declaring that they have experienced no summer depression in business volume since the installation of air conditioning. Instead, they

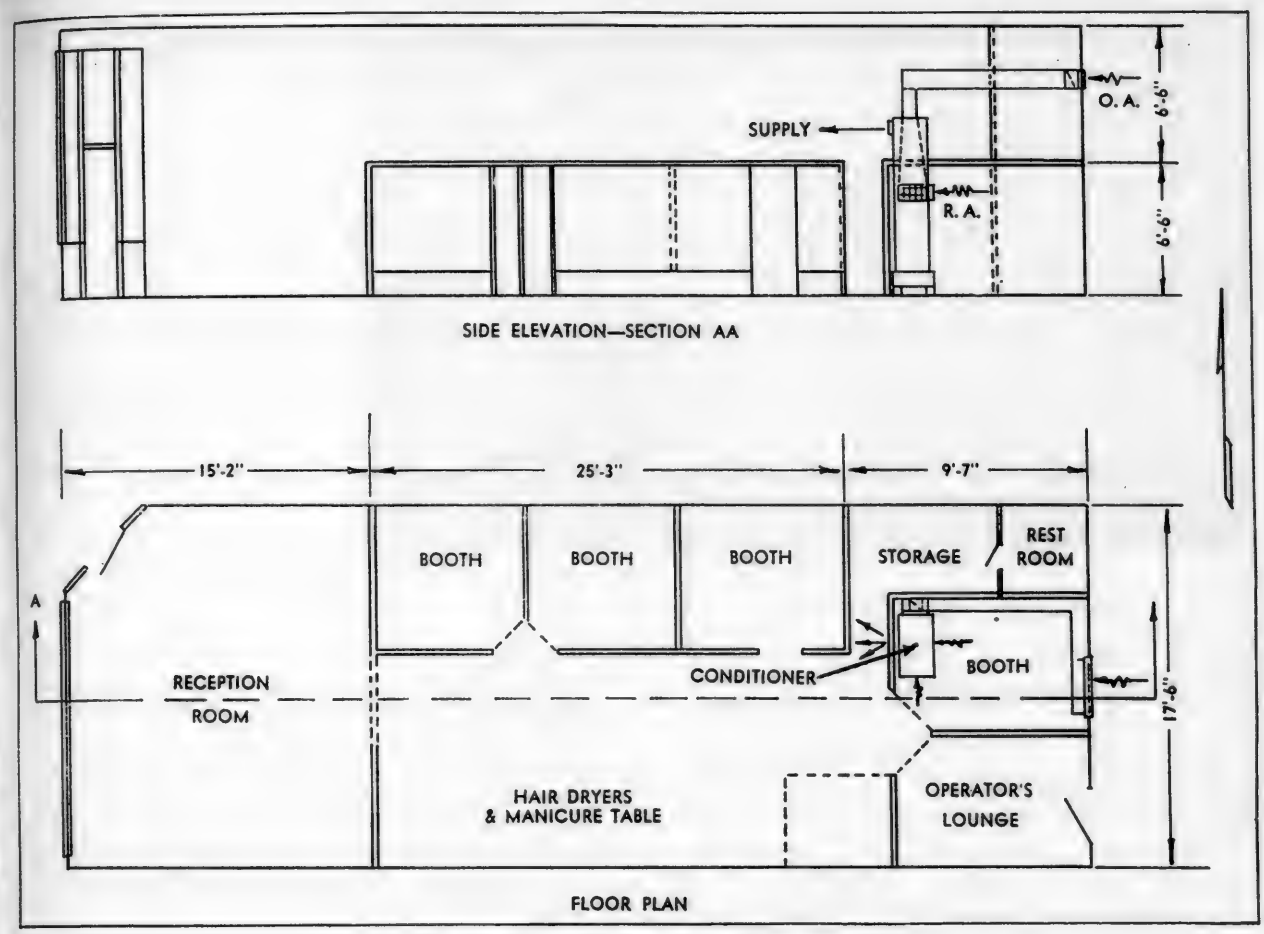


Fig. 2. Layout for Case A design problem.

find that they have gained new customers during the summer months, many of whom become repeat business and eventually develop into year-round patrons.

The owner of one large air conditioned beauty shop stated that it was not unusual for customers to arrive in advance of their scheduled appointments in order to relax in his air conditioned reception room. Customers who had been reluctant to sit through more than an occasional shampoo, prior to the air conditioning of the shop, were now ordering other services. Many owners of air-conditioned shops emphasized the reduction in cleaning and redecorating expenses which they had experienced. Draperies and curtains required less frequent cleaning and changing. Walls and fixtures required less frequent cleaning, papering or painting. Merchandise on display remained clean and in good condition.

AIR CONDITIONING DESIGN DATA

Air Distribution and Ventilation

Proper distribution of air is of prime importance in beauty shop air conditioning applications. Due to the partitions around each booth, it is often difficult to obtain proper air circulation within the booth. This problem can be minimized by keeping the partitions as low as possible, and by leaving an open space between the bottom of the partition and the floor. When the dryers are located in a group, as is the usual practice, care must be taken that adequate air is supplied to this space to handle the heavy concentrated load.

The quantity of outside air introduced for ventilation purposes should never be less than 10 cfm per occupant

TABLE 1—HEAT GAIN FROM APPLIANCES

Appliance	Miscellaneous data	Heat Gain, Btu per Hr		
		Sensible	Latent	Total
Hair dryer, blower type, electric	Fan 165 watts Heating element— Low 915 watts High 1580 watts	2,300	400	2,700
Hair dryer, helmet type, electric	Fan, 80 watts Heating element— Low 300 watts High 710 watts	1,870	330	2,200
Hair dryer system, 5 helmets gas		15,000	4,000	19,000
Hair dryer system, 10 helmets, gas		21,000	6,000	27,000
Permanent wave machine, electric	60 Heaters at 25 watts each, 36 in normal use.	850	150	1,000

Fig. 3. Reception room for Case B design problem.

and must amount to at least one air change per hour to stop infiltration.

Types of Air Conditioning Systems

Because of the many variations in size and arrangement, each beauty shop presents an individual problem in the application of air conditioning equipment. However, the equipment used is generally one of four types. These are:

(1) Packaged or unitary systems without ductwork.
(2) Packaged or unitary systems with ductwork.
(3) Conditioner with remote condensing unit.
(4) Central station systems.

Appliance Load

In figuring appliance loads, the values from Table 1, which lists common equipment, may be used.

People Load

In figuring occupancy load, the following adjusted figures from ACRMA Application Standards may be used:

Customer (seated) 185 Btu per hr sensible, 195 Btu per hr latent.

Operators (standing) 210 Btu per hr sensible, 260 Btu per hr latent.

Rule of Thumb Data

For rule of thumb preliminary estimating purposes, a figure of 1 ton of refrigeration per operator's booth may be used.

CASE HISTORIES

Case A—Packaged Without Ductwork

The owner of a small unpretentious beauty shop, located in a large Midwestern city, requested recommendations for summer air conditioning.

The shop, located in the downtown section of the city, was 17½ ft wide x 50 ft deep with a 13 ft ceiling. In this space were located four operators' booths, an operators' lounge, a customers' coat room, four hair dryers and a manicure table, a storage space, and a reception room. (See Fig. 2).

The owner of this shop stated that his major problem was maintaining a comfortable condition in the hair drying compartment. He stated that although some discomfort had been experienced in the operators' booths, the condition in the hair drying compartment was most critical. He was not particularly interested in air conditioning the storage space nor the operators' lounge, which were seldom used during normal business hours.

A summation of the requirements for the air conditioning system was set up as follows:

(1) Cool and dehumidify the entire space with the exception of the storage space and the operators' lounge.
(2) Supply adequate outside air for ventilation purposes.
(3) Filter the air delivered to the conditioned spaces.
(4) Supply adequate air circulation to compensate for the critical heat gain in the hair dryer compartment.

Design Factors

The beauty shop was located in an area where the standard summer design conditions were outside, 95F db, 78F wb; inside, 80F db and 50% rh.

Outside air sensible load factor = 15 Btu/hr/cfm (ARI).

Outside air latent load factor = 25.5 Btu/hr/cfm (ARI).

The available service facilities included:

Electricity — Power 220-volt, 2-phase, 60-cycle
Water — 85F at 50 psig
Drain facilities — As required

The internal loads were typical of those found in a beauty shop of this size:

People	
Operators—number	4
Customers—number	10
Lights—watts	480
Permanent wave machine	1
Hair dryers (helmet type)	4

On the basis of 10 cfm per person, 140 cfm of outside air was required. However, this was less than one air change per hour and in order to meet this require-

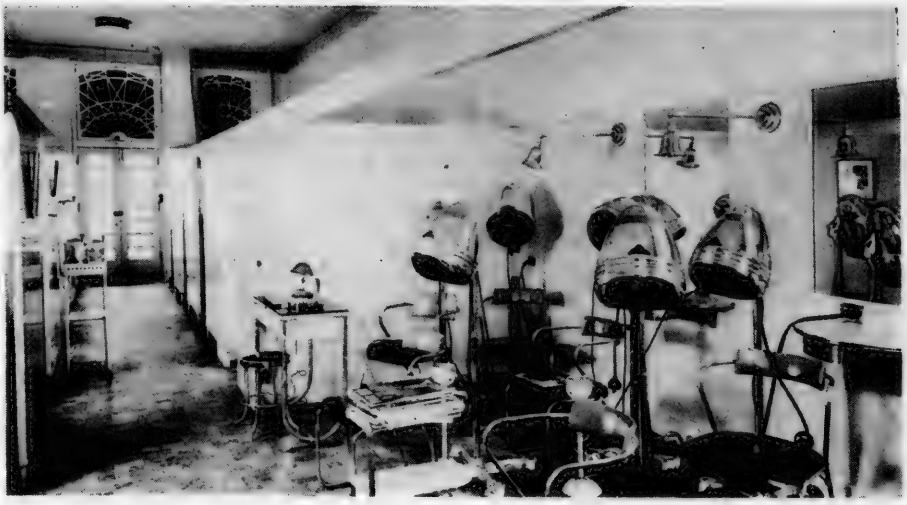


Fig. 4. Dryer space and operators' booths for Case B design problem.

ment, 200 cfm of outside air was used, corresponding to 14.3 cfm per person.

Analysis of Problem

The size of the installation, together with the general layout of the space to be conditioned, indicated that the most satisfactory equipment selection would be a self-contained unit located within the conditioned space. The two possible locations for the unit were in the reception room at the front with the air flow directed toward the rear of the shop, or in the operators' booth at the rear with the air flow directed towards the front of the shop. The latter location was the one selected. The layout of the shop and the location of the unit are shown in Fig. 2.

Although successful air distribution has been accomplished in beauty shops having similar fixture arrangements by placing the unit air conditioner directly on the floor, it was decided that in this case the best air distribution could be obtained by placing the unit on a pedestal to obtain a supply grille height of about 9 ft above the floor. With this arrangement it was felt that there would be no difficulty in obtaining the 45 ft air throw required.

Load Calculations

Sensible Load, Btu per hr

Outside air = 200 x (95—80)	= 3,000
Walls, floors and ceiling heat leakage	= 22,030
Lights = 480 x 3.4	= 1,632
People	
Operators = 4 x 210	= 840
Customers = 10 x 185	= 1,850
Permanent wave machine	= 850
Hair dryers = 4 x 1870	= 7,480
Fan and compressor motor (estimated)	= 8,000
Internal Sensible	= 42,682
Total Sensible = 42,682 + 3,000	= 45,682

Latent Load, Btu per hr

Outside air = 200 x 25.5	= 5,100
People	
Operators = 4 x 260	= 1,040
Customers = 10 x 195	= 1,950
Permanent wave machine	= 150
Hair dryers = 4 x 330	= 1,320
Internal Latent	= 4,460
Total Latent = 4,460 + 5,100	= 9,560

Equipment Selection

A quick check of self-contained conditioner performance ratings showed that a unit handling approximately 2,000 cfm would be required.

Total air circulation	2,000 cfm
Outside air at 95F db and 78F wb	200 cfm
Recirculated air at 80F db and 50% rh	1,800 cfm

On the above basis, the resulting air mixture entering the cooling coil would be 81.7F db and 50% rh. From the rating tables, with the above entering air conditions, one 5 hp self-contained conditioner handling 2,000 cfm with a ¾ hp fan motor was selected.

Controls

Compressor operation was controlled by an adjustable thermostat with bulb located in the return air. Provision was also made for operation of the fan for ventilating purposes without the operation of the compressor unit.

Case B—Packaged System with Ductwork

The owner of an exclusive beauty shop located in a city in the Midwest requested recommendations for summer air conditioning.

The space to be conditioned consisted of the first

TABLE 2—SUMMARY OF LOADS, TONS

Item	Sensible	Latent	Total	Multiplier
Internal	3.56	0.37	3.93	1.10
Outside air	0.25	0.43	0.68	
Overall	3.81	0.80	4.61	1.21

TABLE 3—SPACE AND CONDITIONER LOADS, TONS

Item	Heat Load	Conditioner Capacity
Sensible	3.81	3.92
Latent	0.80	1.77
Total	4.61	5.69

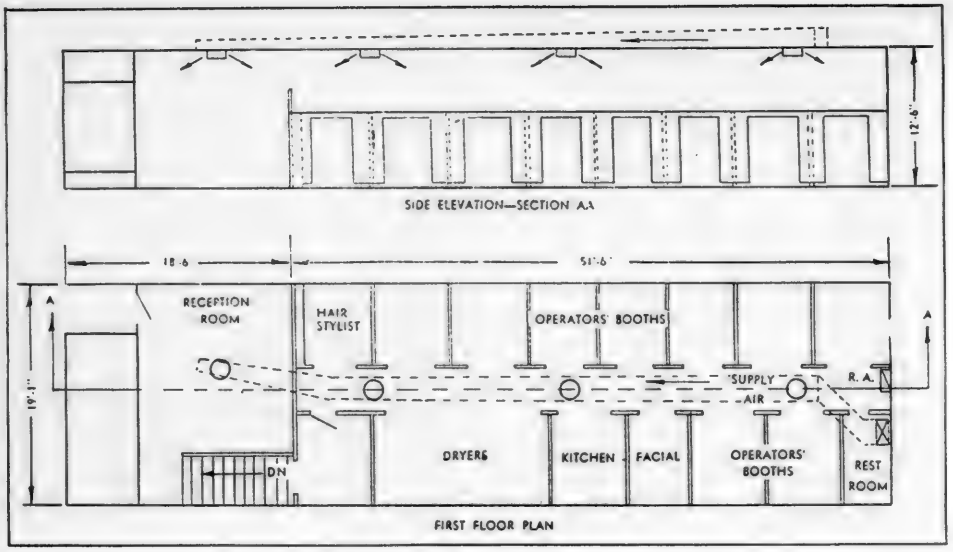


Fig. 5. First floor layout, Case B.

floor and a portion of the basement (See Figs. 3, 4, 5 and 6). The first floor space consisted of a reception room, 9 operators' booths, a hair stylist's booth, a facial booth, a hair dryer space, a kitchen and a rest room.

The basement included three permanent wave booths, a dressing room and storage space. Only the permanent wave booths in the basement were to be conditioned.

The owner specified that the air conditioning equipment be located in the rear storage space in the basement, and that provision be made for conditioning the dressing room and storage spaces in the front part of the basement when required by expansion of the business. She also specified that because of high water costs, some form of evaporative cooling be employed for condenser cooling water.

After consultation with the owner, the requirements for the air conditioning system were set up as follows:

(1) Cool and dehumidify the entire first floor and the operating space in the basement.
(2) Supply adequate outside air for ventilation purposes.
(3) Filter the air for these areas during all seasons.
(4) Provide adequate air distribution and air conditioning capacity for possible expansion of operations in the basement space.
(5) Keep water consumption at a minimum by use of cooling tower or economizer.
(6) No equipment to be located in conditioned spaces.
(7) Use of either packaged equipment or air unit with separate condensing system optional.

Work in this shop was done by appointment only, with two customers scheduled for each operator at all times. There would be no more than one customer at any one time on which the hair stylist would be working, nor would there be more than two or three customers waiting in the reception room at any one time. There were nine operators on the first floor. The total occupants on the first floor would thus be eighteen patrons receiving service from operators, one from the hair stylist, and two waiting in the reception room, making a total of twenty-one customers in addition to nine operators, one hair stylist and the manager of the shop, or a total of 32 persons.

Although it is customary to have one hair dryer for each operator in use at all times, the owner of this shop stated that the eight dryers located in the hair drying compartment were all that she ever used, but emphasized, however, that they were in use 100% of the time. She had five hair dryers in the basement, which she stated were in reserve and were for emergency use only.

The owner of this shop did not anticipate more than six occupants in the basement at any one time. Although she has five permanent wave machines, it was her opinion that there would never be more than three of these machines in use at any one time. She emphasized the fact that the cold wave has almost completely replaced the use of the permanent wave machine.

Design Factors and Problem Analysis

The beauty shop was located in an area where the standard design conditions were: outside, 95F db and 78F wb; inside, 80F db and 50% rh.

Outside air sensible load factor = 15 Btu/hr/cfm
Outside air latent load factor = 25.5 Btu/hr/cfm

The available service facilities included:

Electricity: Power 220-volt, 2-phase, 60-cycle
Water: 80F, 65 psig. Price high, use restricted
Drain facilities—As required

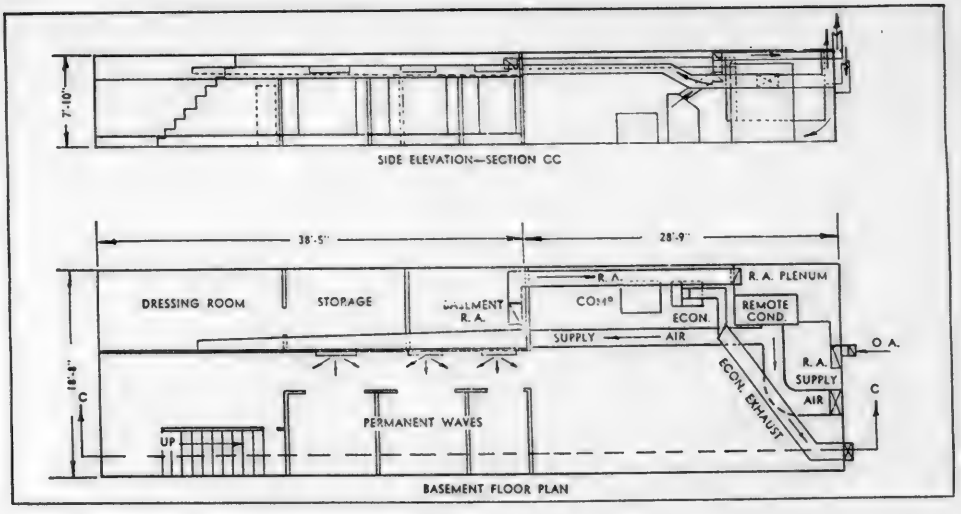
The internal loads were:

People—number	
First floor—operators	11
customers	21
Basement—operators	2
customers	4
Lights—watts	
First floor	2,300
Basement	800
Permanent wave machines	3
Hair dryers (helmet type)	8

On the basis of 10 cfm per person minimum ventilation air, 380 cfm outside air would be required. However, since this is less than one air change per hour, the minimum necessary to prevent infiltration, a figure of 420 cfm was used for calculating outside air load.

The owner had stated her intention to install a false ceiling in the first floor space as a part of her remodeling

Fig. 6. Basement layout, Case B.



plans so the decision was made to supply air to the first floor by means of a duct located above this ceiling, with ceiling outlets taken from the bottom of the duct shown in Fig. 5.

The low ceiling height in the basement made it impractical to use a ceiling duct with bottom outlets, so a ceiling duct with side outlets was used. This duct ran centrally down the full length of the basement, and was sized to comply with the owner's request for provision for future conditioning of the balance of the front portion of the basement. (See Fig. 6.)

In planning the return air ducts from the conditioned spaces to the air conditioning unit, it was not considered necessary to incorporate individual return grilles for each booth. Since there was an open space between the bottom of each booth partition and the floor, uniform air return could be obtained by placing one return air grille at the end of each space. For the first floor, this return air grille was placed in the center of the corridor at the extreme rear of the space. Since the rear entance to this beauty salon opened into an alley and there was very little traffic into the extreme rear of the corridor, it was considered satisfactory to place the return grille in the floor. The return air grille in the basement likewise could be placed in the rear of this space. The most satisfactory and convenient place for the grille was in the ceiling of the basement.

Due to surrounding tall buildings which would prevent adequate air circulation, it was not considered feasible to use an outdoor atmospheric type cooling tower on this job. Presented with the alternative of an indoor forced draft cooling tower or an economizer, the owner expressed a preference for the latter. Since the self-contained air conditioner which would normally be used for a job of this size is equipped with water-cooled condensers as standard equipment, the application of an economizer necessitated the use of remote air conditioner with separate condensing system. (as in Fig. 7.)

TABLE 4—SUMMARY OF LOADS, TONS

	Sensible	Latent	Total	Multiplier
Internal, first floor	4.23	0.79	5.02	
Internal, Basement	0.79	0.15	0.94	
Fan (Estimated)	0.50	...	0.50	
Total Internal (1)	5.52	0.94	6.46	1.17
Outside air (2)	0.53	0.89	1.42	
Overall (1 + 2)	6.05	1.83	7.88	1.30

Load Calculations

FIRST FLOOR

Internal Sensible Load, Btu per hr

Walls, floor and ceiling heat leakage	=	21,890
Lights = 2,300 x 3.4	=	7,830
Hair dryers = 8 x 1870	=	14,960
People		
Operators = 11 x 210	=	2,310
Customers = 21 x 185	=	3,890
Internal Sensible, First Floor	=	50,880

Internal Latent Load, Btu per hr

Hair dryers = 8 x 330	=	2,640
People		
Operators = 11 x 260	=	2,860
Customers = 21 x 193	=	4,050
Internal Latent, First Floor	=	9,550

BASEMENT

Internal Sensible Load, Btu per hr

Walls and floor heat leakage	=	2,980
Lights = 800 x 3.4	=	2,720
People		
Operators = 2 x 210	=	420
Customers = 4 x 185	=	740
Permanent wave machines = 3 x 850 ..	=	2,550
Internal Sensible, Basement.	=	9,410

Internal Latent Load, Btu per hr

People		
Operators = 2 x 260	=	520
Customers = 4 x 195	=	780
Permanent wave machines = 3 x 150 ..	=	450
Internal Latent, Basement..	=	1,750

OUTSIDE AIR

Sensible:
= 420 x 15 ..... = 6,300 Btu per hr

Latent:
= 420 x 25.5 ..... = 10,700 Btu per hr

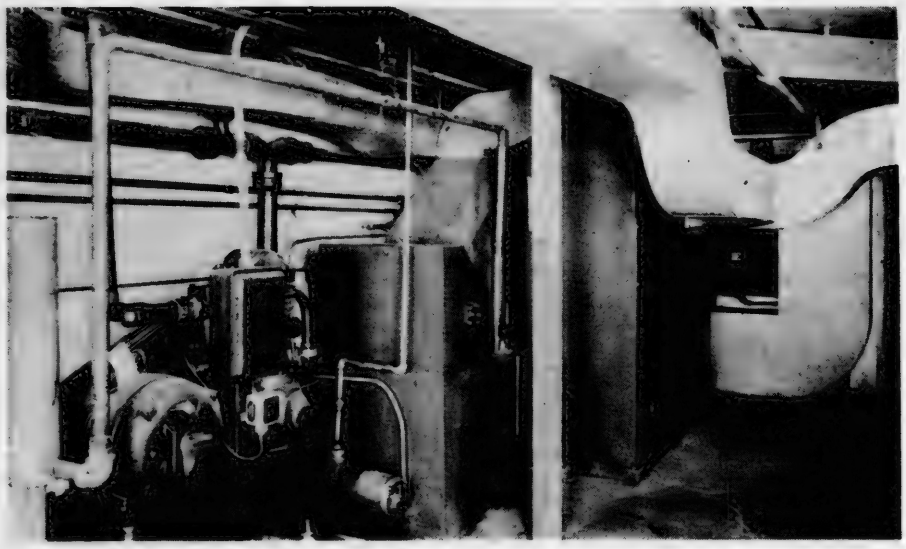


Fig. 7. Compressor unit, economizer, air conditioner and duct-work, Case B.

Equipment Selection

A check of Freon-12 unit ratings showed that the 7½ hp compressor unit would balance at the necessary tonnage with a unit economizer at an evaporator temperature of 45F and condensing temperature of 100F. The economizer was provided with a 1 hp fan motor and a 1/6 hp circulator.

When using 600 cfm per sensible ton of cooling, the resulting diffusion temperature (between the grille temperature and the air conditioned space temperature) is 19F. A diffusion temperature from 15 to 25F is considered as a desirable condition with an average of about 20F being more favorable. An exception is where a special diffusing grille is used when attempting to admit conditioned air to the room with a greater diffusion temperature than 25F. In fact, a 25F diffusion temperature may be considered to be an upper limit for comfortable conditions when one is using ordinary side wall grilles.

Based on approximate 20F diffusion temperature, it requires about 600 cfm per sensible ton to obtain that result. Therefore, a rule of thumb is to have 600 cfm per sensible ton of cooling to determine the approximate total cfm to be circulated within a space. This has to be cross checked with desirable air circulation within the space for a comfortable condition. There are many factors which enter into such a choice, such as the height of the grille, the distance of throw to be obtained, and the density of load per cubic foot of space. Other points must also be considered.

Using this figure of 600 cfm per sensible ton of cooling, and from Table 4, 5.52 tons for the total internal sensible load, we obtain a required circulation of 3312 cfm in this case; 420 cfm of outside air were used, and the air mixture condition entering the coil was 81F db and 50% rh. A remote conditioner circulating 3860 cfm at 500 fpm face velocity was selected to operate at 45F evaporator temperature to produce the necessary capacity. This conditioner had one 48-inch six-row coil and one fan driven by a 2 hp motor.

Operating under the conditions specified, the system of compressor, economizer, and remote air conditioner produced 6.4 sensible tons and 1.9 latent tons totalling 8.3 tons, as against 6.04 sensible tons and 1.84 tons latent totalling 7.88 tons required.

Controls

Compressor operation was controlled by a room thermostat located near return air grille on first floor.

Distribution of supply air to first floor and basement was made proportional to internal loads of the two spaces, with 3,260 cfm delivered to first floor and 600 cfm to basement. A splitter damper permitted manual adjustment of this distribution to provide for unusual loading conditions.

Operating Experiences

Since the air conditioning equipment used in this installation was placed on a separate electric meter, it was possible to obtain actual power costs for a season's operation. These are listed by months as follows:

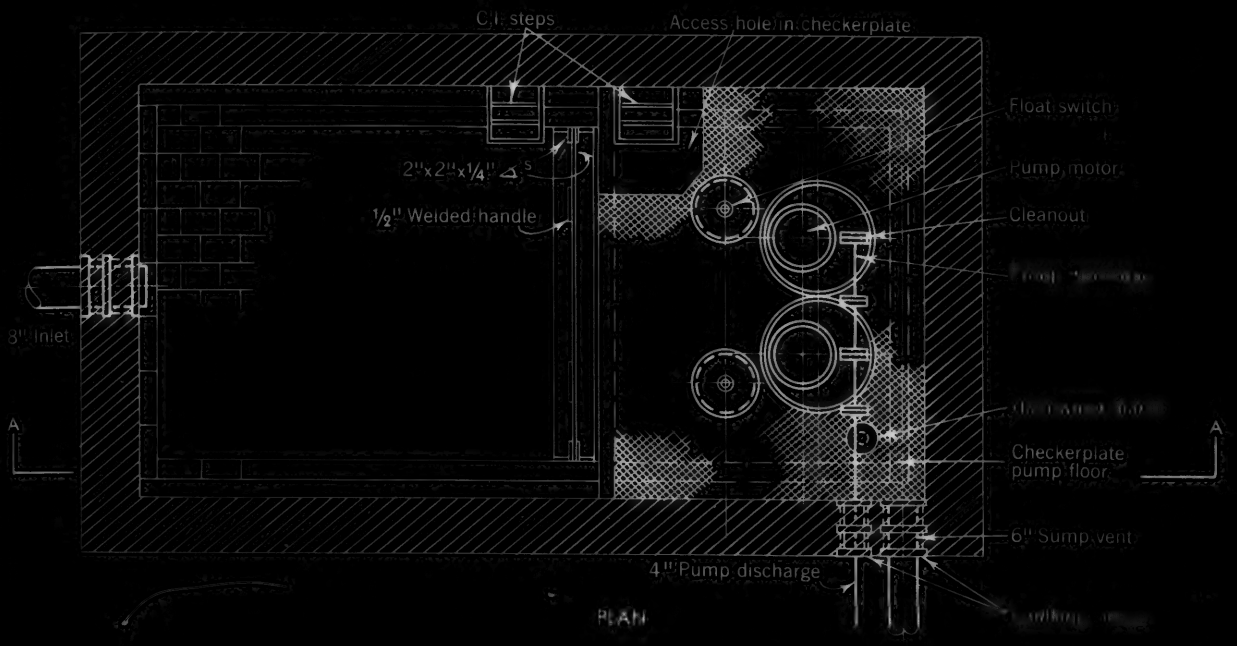
January	$ 1.63
February	1.58
March	1.53
April	7.44
May	1.53
June	7.40
July	34.13
August	65.34
September	56.07
October	32.45
November	10.32
December	1.53
Total	$220.75

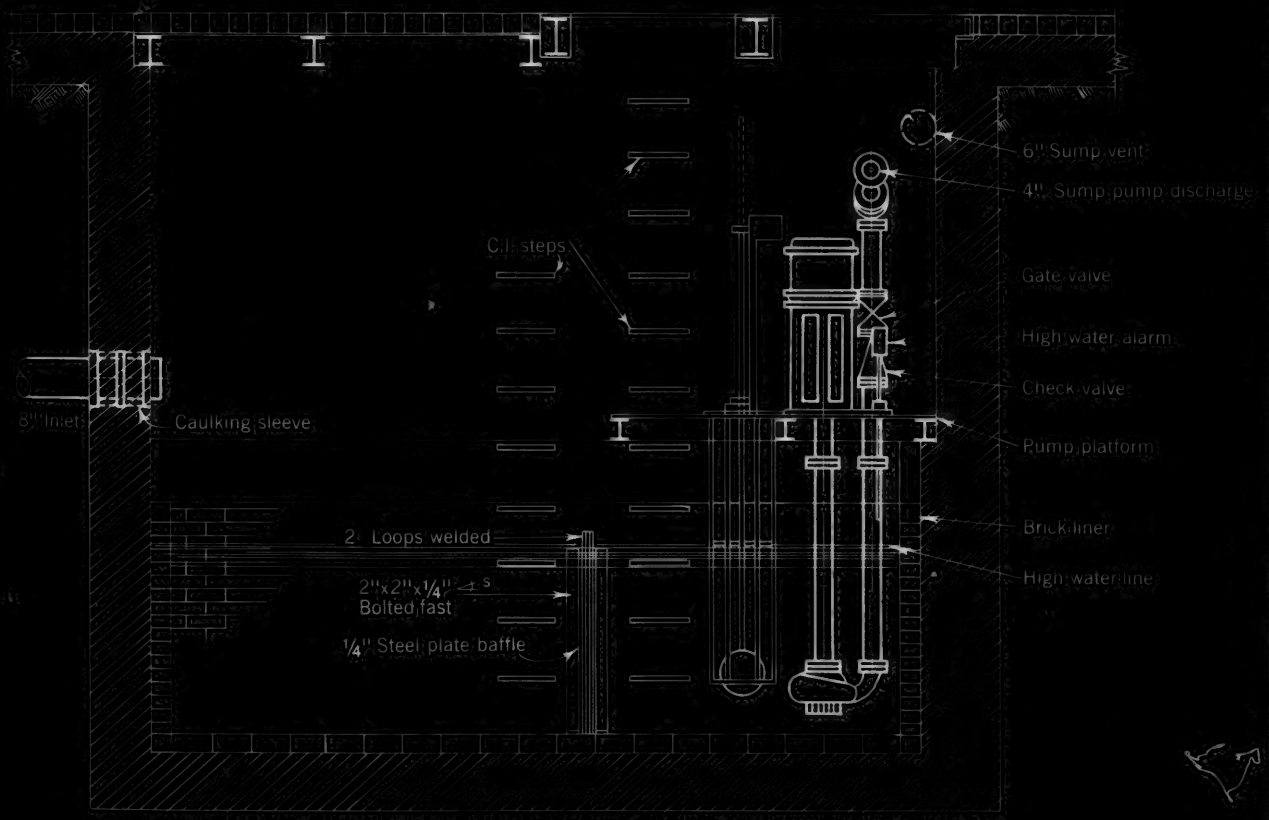
The number of employees was 12 for all months with the following exceptions:

April	13
May	13
August	11
November	11

The owner expressed complete satisfaction with the installation and stated that the cost was more than justified by the satisfaction and comfort afforded to both customers and employees.

SUMP PUMP INSTALLATION



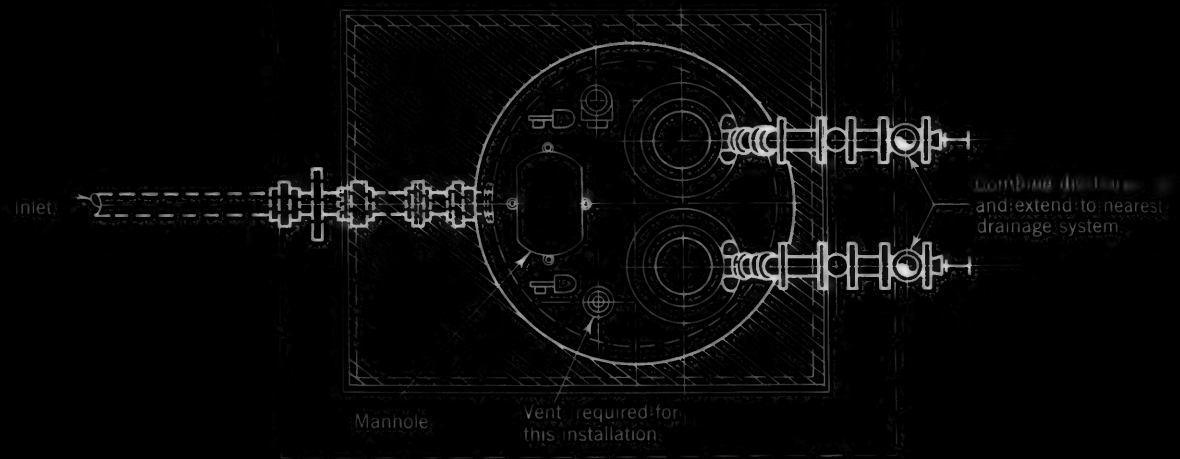


SECTION A-A

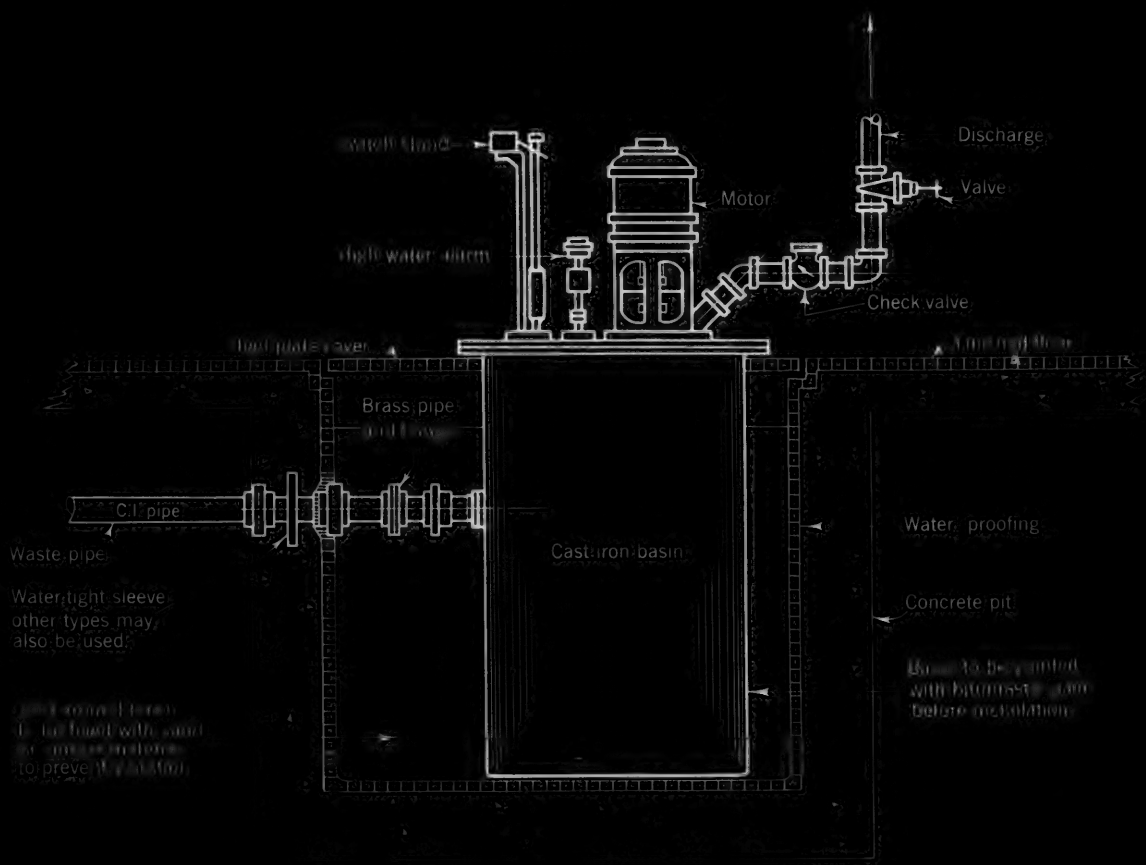
COURTESY: ALBERT KAHN ASSOCIATED Architects & Engineers, Detroit, Michigan

HEATING AND VENTILATING'S DETAIL SHEET

SUMP PUMP INSTALLATION



PLAN



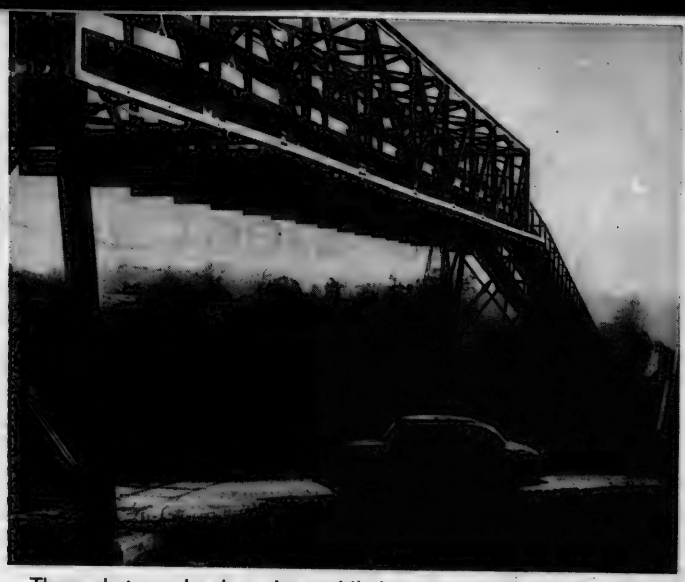
ELEVATION

[illegible] for all types of [illegible] where drainage piping is required for certain equipment and where ground water is a problem to the extent that it is necessary to waterproof the floor area. The drainage sump can be installed, the pit [illegible] then the sump pump and basin installed.

[illegible] BLENDERMANN ENGINEER, GLEN COVE, N.Y.

HEATING AND VENTILATING'S DETAIL SHEET

Conveyor handles rough terrain without difficulty. Foreground flight of belt climbs at an angle of 12 degrees. By comparison, the automobile in the background must shift to low gear.



These photographs show the world's longest permanent rubber conveyor belt system, installed by B. F. Goodrich Company, Akron, Ohio, to convey 800 tons of coal per hour from a strip mine, over 4½ miles of travel, to storage on the bank of the Muskingum River. The conveyor serves the Muskingum River Plant of The Ohio Edison Company. The entire conveyor system is composed of 14 flights or sections ranging in length from 500 to 2,964 ft. The belts are 36 inches wide and travel at a speed of 600 fpm. Above, the beltroad bridges a county highway and descends to the rolling countryside. From point illustrated, it is 1½ miles to the river.

World's Largest Belt Conveyor

(Right) The beltroad crosses a main highway as it approaches the Muskingum River at the end of its roller-coaster journey.

(Below) Conveyor makes a 90 deg turn. Belt in foreground discharges coal into a hopper at this transfer point and the hopper, in turn, serves the belt moving in another direction.

(Below) This 2,100 lb portable vulcanizer turned 50 rolls of rubber belting into the continuous conveyor. After belts are properly cemented, they are placed in the vulcanizer.

Court Decisions of Interest to Heating Contractors

LEO T. PARKER

Attorney at Law, Cincinnati, Ohio

Higher court citations arranged to answer a number of legal questions asked by heating contractors, and buyers and sellers of heating equipment.

THE past Summer, the writer traveled several states in the West and Southwest and talked with many heating contractors, buyers and sellers of heating equipment. A majority of these persons, it was found, are considerably concerned over their own legal problems, and their desire to win unavoidable law suits. When discussing with these persons their legal problems I made many notes. Soon after returning to my office in Cincinnati I began a search of new and leading higher court decisions to verify my answers. Hence, the purpose of this article is to explain interesting and important law intended to assist all readers to avoid expensive legal controversies. Obviously the hereinafter leading higher court citations can be used very advantageously by readers and their lawyers to win favorable verdicts in undesirable and unavoidable law suits.

Contractor Liable for Negligence

A reader asked this question: "Is a heating contractor liable to a property owner for damages indirectly caused by the contractor?"

According to a late higher court decision, a heating contractor is liable for all financial losses to a property owner caused directly or indirectly by the contractor's negligence.

For illustration, in Knell v. Morris Heating Company, 247 (2d) 352, it was shown that a heating contractor was called to repair a leaking water heater on the second floor of a building. The contractor's employe attempted to repair the leak with a radiator compound. Later the heater leaked and ruined valuable merchandise belonging to a tenant on the lower floor.

In subsequent litigation, the higher court held the heating contractor liable for full damages sustained by the lower floor tenant. This court explained that whenever a heating contractor effects damage, as a result of his negligence, such contractor must be held liable for full resultant damages.

Contractor Can Sue

A reader asked: "If city officials refuse to award a contract to the lowest bidder, who can sue to compel the city officials to comply with their obligations?"

According to a late higher court decision, the contractor himself may file the suit, or any other taxpayer.

For example, in State ex rel. Acme Auto Radiator Company v. Burke, 110 N. E. (2d) 623, the Acme Auto Radiator Company (hereinafter called "Acme") sued certain officials and a City. Acme alleged that it is a taxpayer, and that a contract for services and material required for repairing auto radiators for the Department of Public Service of the City was awarded to another company and not to Acme which was the lowest responsible bidder. It alleges that the awarding of the contract, under an "arbitrary, artificial and inaccurate method of evaluating bids," was "arbitrary, capricious, a gross abuse of discretion and was illegal."

The City officials argued that (1) Acme does not have legal capacity to sue, and (2) the suit does not state sufficient facts.

However, the higher court held that an unsuccessful low bidder for a contract to furnish services and material required for repairing automobile radiators for a department of the City had the legal capacity, as a taxpayer in City, to bring suit against City and the city officials challenging awarding of such contract to another bidder on the ground of abuse of discretion.

Must Respond to Complaint

Recently I received a letter from a heating contractor, as follows: "If a property owner owns gas service lines and appliances, is the gas company obligated to inspect these lines and appliances on complaint of the property owner that gas is leaking into the premises? Or must the property owner employ a heating contractor to inspect the premises?"

According to a late higher court decision, the answer to the first question is yes. This is so because the higher courts definitely hold that a gas corporation is rendered liable for damage caused by gas explosions, if the testimony shows that the corporation's officials completely ignored a complaint of escaping gas made by a consumer.

For illustration, in Blass v. Lone Star Gas Company, 236 S. W. (2d) 526, it was shown that a property owner detected the smell of gas escaping near the meter in his basement. The property owner notified the gas company that gas was leaking in his basement, but the company failed to send anyone to make an investigation. Soon afterward an explosion occurred effecting considerable damage. The property owner sued the gas company for heavy damages.

During the trial an employe of the gas company testified that when he installed the meter and regulator at the house he tested them and all other connections and service lines to detect leaks, and that absolutely he found no leaks. Also, the evidence showed that at the time of installation the meter was inspected and tested by the gas corporation's employes, and that it did not leak.

In view of this testimony the property owner argued that, although the gas leak originated in his pipes or appliances, the gas company was liable because it failed

to send employes to inspect the building after receiving information that gas was leaking in the basement. It is interesting to observe that the higher court held the gas company liable, and said:

"It is undisputed that the defendant (gas company) after being warned of escaping gas, made no inspection of its service facilities. In the case here there is evidence of an explosion and that gas was escaping and had been escaping either from defendant's (property owner's) service facilities or from the facilities installed and owned by appellants (gas company) for some two weeks before the explosion, and that the gas company had received notice of the escaping gas, but made no inspection or test for the escaping gas after receiving such notice from the property owner."

For comparison, see Minnesota Light and Power Company v. Hoover, 102, 229 P. 285. In this case the higher court held gas company liable for an explosion because the testimony showed that although the lines were owned and controlled by the property owner, the company failed to make an inspection of the various lines after receiving notification from the property owner that gas was escaping and that an apparent danger existed. The court in this case said:

"The liability of the gas company, if any, must be predicated upon its knowledge of the defective condition in case of appliances not owned nor installed nor controlled by it. It is generally held that where the appliances which have caused injury are not owned or controlled by the company, such company is not liable for the damage sustained."

In other words, irrespective whether a gas company owns service lines or heating appliances, used by a property owner, such gas company is obligated to inspect the premises when it has knowledge that gas is escaping in or around the premises.

Must Be Specific

Another reader asked this question: "Can a heating contractor collect a bill based on a general statement or should he include a detailed bill or invoice with the general statement?"

According to a late higher court decision, heating contractors are expected by the courts to keep complete books showing details of every transaction and contract, such as the dates labor was performed; and the time consumed. Also, these detailed records must be presented to a court as evidence if the contractor files suit against a property owner to collect payment for materials and labor furnished to do a job.

For illustration, in OK Plumbing and Heating Company v. Shidler, 229 Pac. (2d) 145, a heating contractor sent a property owner a bill for $3,908.94 which represented the labor and materials used to complete a job for the property owner. The bill stated: "Balance due on contract" followed by a notation of the named job and the amount claimed to be due.

The property owner refused to pay the account and demanded that the heating contractor furnish complete data as to the dates, time, amounts, occasions and the nature of the contract on which the contractor expected payment.

The contractor did not supply the demanded data and the higher court held that the contractor was not entitled to collect as he had failed to comply with such demand and could not expect a favorable verdict.

Manufacturer Is Subcontractor

A manufacturer asked: "If a heating contractor purchases heating equipment from a manufacturer and installs same in the building, what rights has the manufacturer if the heating contractor refuses to pay for the furnaces?"

The answer is: The manufacturer can sue and recover payment from the contractor, or he can file a mechanic's lien against the building in which the contractor installed the equipment.

For illustration, in Des Moines Furnace & Stove Repair Company v. Lemon, 56 N. W. (2d) 923, the testimony showed facts as follows: A heating contractor purchased furnaces from a manufacturer and installed them in a building. The building owner paid the contractor who failed to pay the manufacturer.

The higher court held that the contractor who installed the furnaces was a "contractor" and the furnace manufacturer who furnished the furnaces and charged the furnaces to the particular job was a "subcontractor" within the mechanic's lien statute.

This court held that the manufacturer was entitled to a valid mechanic's lien on the building to compel the property owner to pay for the furnaces. This was so although the property owner had already paid the heating contractor and the property owner had no knowledge that the manufacturer had furnished the furnaces.

Partners Must Work

Contrary to the belief of many readers, every partner is expected by law to devote his time, money and effort to make the business partnership both successful and profitable.

A reader asked this question: "I entered into partnership with another heating contractor who has not been working regularly and who expects me to earn the profit for both of us. What are my legal rights?"

In Degen v. Brooks, 43 N. W. (2d) 755, the testimony showed that a man named Degen and one Brooks each had worked at the heating trade for more than fifteen years. These persons established a heating business or partnership under the name of Brooks Plumbing and Heating Company. Later Degen did not devote his full time working for the partnership.

The higher court held that Degen must pay Brooks for his services on days when Degen failed to work for the partnership. The court said:

"If one partner refuses, without good cause, to perform the services to which he has agreed, the other will usually be given an allowance therefor, or a deduction will be made from the share of the partner who did not perform his agreed service."

Seller Liable for Breach

Modern higher courts consistently hold that a seller of heating equipment and supplies who breaches a contract always is liable in full damages to the purchaser. Recently a reader wrote, as follows: "If a purchaser of heating equipment has good intentions when he signs a contract, and then proceeds to fulfill his obligations, what

are his various legal rights against the seller who breaches the contract?"

Modern higher courts consistently hold that if a seller commits a clear and positive breach of the contract, the purchaser may recover full sustained damages. If the purchaser has made any payments, he may recover the payments made on the contract, plus all sustained damages.

For example, in Martin v. Terre, 43 So. (2d) 925, the testimony showed that one Martin made a verbal agreement whereby a purchaser was to purchase from Martin certain equipment for the agreed price of $2,600, $500 to be paid in cash and the balance to be paid from profits earned by Terre. After the purchase of this equipment, Martin breached the contract, although he had no intentions of performing a breach.

In subsequent litigation, the higher court held that as Martin was the one who breached the contract, he must return the $500 down payment to the purchaser. The court said:

"It seems that the deal was not called off by the defendant (purchaser), but by the plaintiff (Martin) himself; in other words, the plaintiff himself revoked the sale made to the defendant, and under these circumstances, it is equitable to put the parties back in the same position that they were prior to the deal. Defendant is entitled to recover this amount, $500."

The fact that the purchaser failed to assert and prove that he sustained any damages caused by Martin's breach resulted in the court not allowing the purchaser any damages in addition to return of his $500 down payment.

Validity of Oral Guarantee

Considerable discussion has arisen from time to time over the legal question: Is an oral or verbal guarantee valid when a written contract between the buyer and seller states that there are no warrantees?

For example, in Red v. Petty Company, 242 Pac. (2d) 302, the testimony showed facts as follows: A buyer bought certain equipment under a written contract which contained a clause to the effect that the seller gave no "representations or warrantees expressed or implied." Within a few days after taking delivery of the merchandise, the buyer complained that he was not satisfied and sued the seller.

The buyer testified that the seller had verbally guaranteed the merchandise, but the higher court held the seller not liable, saying.:

"Where a written contract provides that there was no warranty, the buyer could not predicate a defense on an oral contract."

Possession of Equipment

Another important point of law is that a purchaser of heating equipment cannot retain possession of the equipment and expect to recover the full contract price from a seller who breached his contract.

For illustration, in F. M. Cooley Company v. Stoeffler, 92 N. E. (2d) 926, the testimony showed facts, as follows: The Cooley Heating Company, a contractor, made a contract with a property owner to furnish and install a furnace and a 275 gal oil tank on the property. When the job was completed the property owner refused to pay the contract price claiming that the contractor substituted a furnace, too small and grossly inadequate and inefficient to properly heat the house. The property owner sued the contractor for damages and rescision of the contract. The testimony showed that the property owner did permit the contractor to take possession of the allegedly under-size furnace. Hence, the higher court held that the property owner could not rescind the contract, and must pay to the contractor the full contract price. The court said:

"The furnace was inadequate to meet the appellant's (contractor's) heat guaranty but it was new when installed and the product of a reputable manufacturer. There is no evidence that it was defective or that it failed for any other reason than that it was too small for the task it was sold to perform. The common experience of mankind compels us to conclude that it not only had value to the appellant (contractor) who is a dealer in heating equipment, but also it had intrinsic value to anyone."

On the other hand, this higher court explained that if the purchaser offers to allow the seller to regain possession of unsatisfactory merchandise, on which the heating contractor breached the sale contract, the purchaser may recover back the full contract price, plus all resultant damages. In such a case the only testimony that will assist a heating contractor to win the suit is evidence that will convince a jury that the heating equipment was not defective when delivered to the purchaser or user. The fact that the contractor did not guarantee the subject of the sale is of little consequence, because if the purchaser proves that it was defective the court will hold the seller liable on an "implied" guarantee that the merchandise is reasonably worth the purchase price, and free from hidden and dangerous defects. In other words, testimony that will assist the seller or heating contractor to win the suit must convince the jury that the equipment or merchandise was not defective nor unusually dangerous when it was delivered to the purchaser then the jury may conclude that negligence of the purchaser caused the injury, and relieve the seller from damage liability.

Dispute Over Stove

For example, in Sanders v. Reed Hardware Company, 54 S. E. (2d) 482, the testimony showed facts, as follows: A woman went to a store and looked at some stoves. She did not want a stove for heating water, and knew nothing about water connections on stoves used for heating water. The seller did not tell her, so she testified, that the stove she purchased was a stove for heating water, but told her it was a plain heater. She purchased the stove and it was delivered to her home by employes of the seller. The purchaser put two legs on the stove, installed a pipe, and connected the pipe to the flue. No water connections were made. The woman started a fire in the heater. After the fire began to get hot the stove exploded. It was broken into numerous pieces, and a piece of metal hit her causing serious injuries. Further testimony showed that the stove was a laundry heater with a water jacket.

The jury decided that the injured woman could not recover damages from the seller because no proof was given that at the time the stove was delivered it was plugged to prevent escape of water and steam. The higher court approved the verdict, saying:

"The plaintiff's (woman's) case was predicated entirely on the theory that the water jacket was plugged at the time it was sold and delivered to her; and that when a fire was started in the stove, steam was generated in the jacket, causing the stove to explode. These questions of fact were for the jury to determine from a consideration of all the evidence, and they were resolved in favor of the defendant (seller)."

Hence, this seller won a favorable verdict simply because he convinced the jury that the stove was not defective and contained no plugs when it was delivered to the purchaser, which implied that the purchaser who installed the stove inserted the plugs.

Of course this purchaser may have won a favorable verdict had she proved that the seller installed the stove, or had she proved that the stove was plugged when delivered to her to prevent escape of steam.

Seller Practiced Fraud

A reader asked this question: "If a seller of heating equipment practices fraud on a purchaser, what legal rights has the purchaser?"

Modern higher courts consistently hold that if a seller breaches a sale contract, the purchaser has three definite actions or courses he can take. First, he can keep defective heating equipment or merchandise and recover from the seller full sustained financial losses, and damages; second, he can return the defective merchandise and recover the full contract price, plus damages; third, he can sue and compel the seller to fulfill the exact terms of the contract.

Very often the higher court awards punitive damages, in addition to normal damages, to a purchaser who is defrauded or otherwise unreasonably imposed on by a seller.

For example, in Ader Company v. Zimmer, 71 S. E. (2d) 270, it was shown that a dealer sold to one Zimmer a 1948 model machine which was in fact verbally represented by the dealer to be a 1949 model. The bill of sale stated that it was a 1949 model.

In subsequent litigation, although the actual difference in the trade-in value of the 1948 and 1949 models was only $200, the higher court awarded Zimmer $1,000 damages, saying that punitive damages, in this case, were justified.

Also, a late higher court held that the seller is liable to the buyer not only for ordinary damages but also for exemplary or punitive damages if he deceives the purchaser.

For example in District Motor v. Rod, 88 Atl. (2d) 489, it was shown that one Rod purchased an appliance represented by the seller to have had little use. Later Rod learned that the appliance that he purchased had had very much use.

In subsequent litigation the higher court held that Rod could recover from the seller all ordinary damages he incurred, plus $400 exemplary damages.

These are two very recent higher court decisions which illustrate circumstances under which a purchaser may recover from a seller punitive damages, in addition to actual or normal damages. Generally speaking, the courts award punitive damages where the testimony shows that the seller practiced fraud to the purchaser's considerable disadvantage and detriment.

Illegal Contract Is Void

Conversely, if a purchaser acquiesces with a seller in an illegal contract, not only is the purchaser deprived from recovering damages for the seller's breach, but the purchaser cannot enforce the contract. For example, a late higher court held that a purchaser who purchases a ticket "on a chance" to win something of value cannot compel the seller of the ticket to deliver the merchandise to the successful winner.

In Holmes v. Saunders, 250 Pac. (2d) 269, it was shown that a charitable organization sold tickets at $1 each which entitled the purchasers to a numbered ticket to be drawn at the Auditorium Arena on a certain date for a valuable appliance.

A man proved that his ticket was drawn and he was declared to be winner of the appliance. However, he was not permitted to take possession of it. He filed suit asking the court to compel the seller of the tickets to give him possession of the appliance which he won. The higher court refused to do so, saying:

"Since plaintiff's (purchaser's) cause of action is on a lottery, which is a criminal offense, the doors of the court are closed to him."

Can't Practice Deceit

Strangely, the higher courts in our United States refuse to approve deceitful practices, irrespective of the ultimate benefits to innocent and deserving citizens. This is so because of the Federal Trade Commission Act, 15 U.S.C.A. 45 (a).

For example, in Dejay Stores v. Federal Trade Commission, 200 Fed. (2d) 867, it was disclosed that a company sold merchandise on the installment payment plan. Some of the company's customers failed to make the agreed payments and moved away with the unpaid-for merchandise. In order to locate these delinquent customers the company used form letters addressed to references previously furnished by the delinquent debtor at the time of his purchase. These letters in part stated to the references, as follows: "I understand that you are a friend of (debtor). I have an important letter for him so please let me have the correct address."

The Federal Trade Commission ordered the company to discontinue using this deceptive plan of obtaining the present address of delinquent customers. The higher court upheld the order saying:

"It is clear that, while the letter is literally true, the information is sought on behalf of the company to assist it in collecting its debt."

Another plan adopted by a dealer to locate the present address of delinquent debtors was to send these delinquent debtors, at their last known address, a double post card reading: "Due to the shortage of transportation and manpower, we are unable to interview you personally. So please fill out detachable card and mail in. Respectfully yours, Personnel Management Bureau."

The return card contained blanks which if filled in would provide the dealer or creditor with the debtor's present address, and his employment status.

The higher court ordered this dealer to discontinue this "deceptive" practice of obtaining present addresses of delinquent customers.

What Would You Do?

Replies to engineering and operating problems of interest to the industrial plant engineer

Conducted by
NATHAN N. WOLPERT
Associate Editor

INDUSTRIAL plants, more than other occupancies, are troubled by different areas in the plant having different heat gains, so that zoning becomes an important part of a central air conditioning system.

There are several methods for providing zoning for air conditioning and two systems are discussed in answer to a query regarding zoning for an industrial plant. The problem in full is presented in a box on this page.

Should you have some comments that you would like to add to the problem scheduled for discussion in next month's issue, or if you have an industrial plant problem that you would like to see presented in this department, you are invited to write to the Editor. Such letters are always welcome.

This Month's Problem

Variation in heat gains in different areas of our plant requires that some changes be made to our central air conditioning system to correct present unbalance. What would be considered an effective and not too expensive zoning system for an industrial plant if the present central cooling plant is to be continued?

This Month's Problem

For the description of two types of systems that could be used, and for the discussion regarding these systems, credit is due to engineers of York Corp., York, Pa. Other systems could be used but this would involve added expense for either individual fans to serve each zone, or double ducts and automatic mixing dampers at supply outlets to the zones.

One suggested system, illustrated in Fig. 1 is the simple reheat system. Air is cooled sufficiently to satisfy the space having the most rigorous requirements, and the air is then reheated for the other spaces, or the reverse may be accomplished with recooling. Reheat may be by means of steam, gas, electricity or condensing system hot gas discharge. The reheat system is wasteful since it doubles up on the energy requirements—that is, it consumes energy in removing heat from the air and then consumes more energy in adding heat back into the air. The condenser reheat method is basically the least wasteful since it wastes compressor power only. Inherently with the reheat system, capacity and power requirements of the refrigeration plant must satisfy the sum of the maximum peak loads for the individual spaces rather than the maximum peak of the building, and no compressor capacity reduction and attendant power economies are possible as internal sensible load decreases.

This method provides excellent flexibility in maintaining constant conditions under varying loads. Control is excellent and simple. The method is most suited to

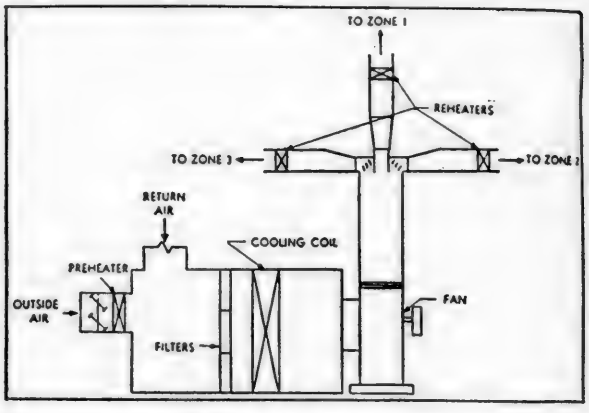


Fig. 1. Simple reheat system.

industrial applications, where benefit to the product or process often subordinates operating and first cost considerations, and power and steam costs may be comparatively low.

A very simple method of zoning is the volume control system, Fig. 2. This method functions by throttling the air supply delivered to a zone or space with an automatic damper.

Heating by zoned direct radiation is recommended with this method, with tempering of the supply air for ventilation purposes.

If summer reheat is desired, heaters must be installed at the volume dampers.

The volume control method is inherently lower in first cost and comparable in operating cost to other economical methods. There are, however, fundamental objections to its use and appreciable departures from ideal perform-

Problem for the Coming Issue

A 30-ton evaporative condenser installed adjacent to the compressor on the ground floor of a multi-story building, proved too small for peak summer air conditioning loads. Because of the expense and space limitations, we do not want to replace the present unit with a larger one. We propose to install a shell and tube condenser cooled by city water for the remaining 7 tons required to handle the full load. This would be placed between the evaporative condenser and the receiver. Is this proposed system practical or can this idea be improved? If such an arrangement is not recommended, why?

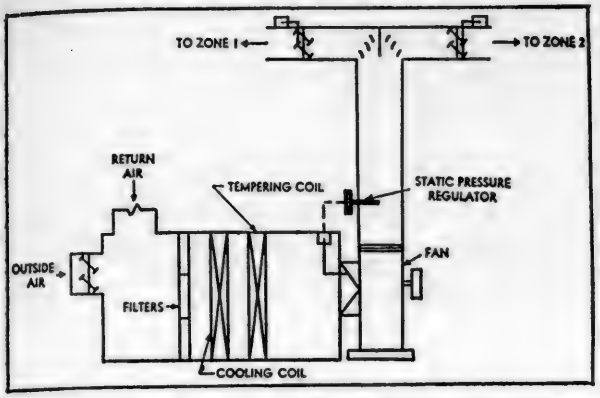


Fig. 2. Volume control system

ance, some of which can be corrected by exercising care in the design. These objections are:

(1) Ventilation air is reduced with supply air reduction as the load falls off.

(2) Less dilution effect on room odors such as tobacco smoke.

(3) Throttling the air disturbs air distribution, frequently causing the occupant to become conscious of the change as a result of changes to the room air motion and noise level.

(4) Outlet grille velocity reduction decreases throw and may cause the cooled air to drop into the occupied zone to create a draft.

(5) The system requires the complication of static pressure regulation of the fan to prevent increased air volume in one zone as a result of volume throttling in another.

Volume control has been most successfully applied where the design contemplates the volume dampers compensating for minor load variations only, with volume regulation limited by stops on the dampers to 25 to 33⅓ per cent of maximum reduction.

With volume control, air cooling and refrigeration capacities can be used for the entire building maximum simultaneous load.

Packaged Air Conditioning Units Serve New TV Station

The formal opening of the new $500,000 facilities for WSAZ, radio and television stations was recently held in Huntington, W. Va. This station is now celebrating its thirtieth anniversary of continuous broadcasting in the West Virginia, Ohio and Kentucky areas.

In the beginning, the station broadcast only four hours a day, and commercial users paid about $4 per hour of time on the air. Before long the station was forced to move to larger quarters. It then had to increase its time on the air in order to handle the number of advertisers and the addition of many more programs.

Like any other successful radio station, it grew physically and in importance to the community and the tri-state area of West Virginia, Ohio and Kentucky. In 1949 the station obtained its television license and, in limited studio space, with limited facilities, beamed its programs to TV set owners in a 100-mile radius. Now installed in its new home, with the finest television equipment, it serves in excess of 1,000,000 viewers.

The Austin Company, Cleveland, was the contractor for the building. The spacious lobby and reception center are beautifully decorated with richly colored draperies, walls and furnishings. A big screen TV set is built into a wall for visitors' entertainment. Just behind the reception center is the glass-enclosed, sound-proof clients' observation lounge where TV commercials and programs or rehearsals can be viewed and discussed in private.

Part of the main studio at Huntington, W. Va., air conditioned by two 10-ton packaged units.

The two television studios are adjoining and have a combined area of over 3,000 sq ft. The larger of the two has 1,600 sq ft of space and can seat an audience of 150 people for either a radio or TV production. It is possible to set up a dozen different production sets at the same time to quickly switch from one to the other.

Seventy-two overhead lights in the two studios can be adjusted for any lighting effect desired. Microphones can be plugged in to 30 different locations, providing excellent sound coverage.

The station has a Frigidaire air conditioning system and a central-zone heating system.

Since there is a terrific heat load in the TV studios from the equipment and powerful overhead lights, it was decided to zone the building to achieve maximum cooling and/or heating where and when it was needed. With this type of installation the complete system need not operate full time.

The air conditioning system consists of five air handling units, each with direct expansion cooling coil and hot water heating coil. Air for executive offices is handled by a 7½-ton self-contained unit. General offices are kept comfortable by a 10-ton self-contained unit, with two more similar units caring for the two large TV studios. A Frigidaire 20-ton compressor connected to an 8-zone fan and coil section provides air at proper temperature for announcers booths, news rooms, transcription room, audition studios and main lobby.

The overall grouping of equipment allows heating only, cooling only, or ventilation only. Any unit can be operated independently of another and is controlled by separate thermostats. A cooling tower is connected to all five systems.

LONDON LETTER

Commentary on developments in Europe by our correspondent in Great Britain

AN important and well-attended event near the close of the year was the Symposium on the Heating and Ventilating of Industrial Buildings sponsored by the Institution of Heating and Ventilating Engineers. The seven papers and the discussions on them have been published in the January and February issues of the Institution's Journal (Address: 49 Cadogan Square, London, S. W. 1).

Natural Ventilation was the first paper, presented by Eric Yould, manager of the Ventilation Department of a Cheshire firm. It forms an interesting sequel to the paper by Dr. Pris noted in the February *London Letter*. Those who like to find expressions of national characteristics in comparisons of this sort have ample opportunity here. The French paper was logical, fundamental in its approach, and theoretical in its treatment even of practical results. The English paper wastes precious little space on theory, but goes straight to what can and cannot be expected from natural ventilation, which types of ventilators work and which do not.

The whole of the theory is summed up in two sentences. Natural ventilation results from the effects of the wind and temperature difference between the air inside and outside a building; the wind acts in two ways, either blowing in through openings on the windward side or exerting an extract effect when blowing across openings in the walls and roof. The airflow resulting from temperature difference is proportional to:

$$\sqrt{\text{Height} \times \text{Mean temperature difference}}$$

This shows the importance of arranging the maximum difference in height between the air inlets and the outlets. In a multi-story building the men working at elevated levels are much benefited by fresh-air inlets at their own level, but these contribute nothing to the ventilation lower down. Indeed, the distribution of fresh air, particularly in a large building, is a matter of some difficulty, and there is much to be said in favour of mechanical supply of fresh air in conjunction with natural means of extraction. Mechanical extraction, however, needs careful handling unless its sole purpose is to extract fumes from isolated pieces of plant equipment; the effect of mechanically impelling the air through some of the outlets is likely to be to convert the other "outlets" into inlets without increasing the flow through the intended "inlets".

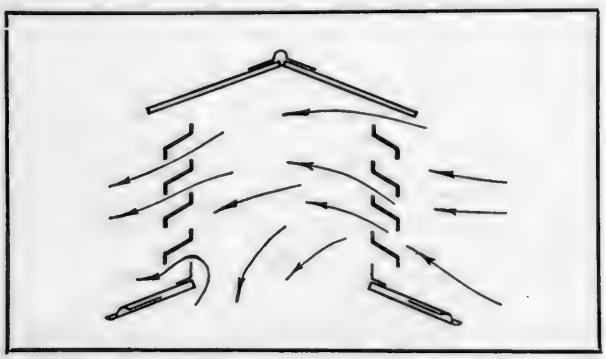


Fig. 1. The roof ventilator arrangement termed Jack roofs in England.

Inlets near ground level of the adjustable louvered type are satisfactory. But for outlets, anything involving adjustment according to the weather, or self-alignment with the direction of the wind, is unsatisfactory. It always goes wrong, and is inaccessible for maintenance. During the discussion a plea was made in favour of opening louvers in roof lights; in a hot factory shop they achieved something more than mere "ventilation" towards the comfort of the men, who liked to be able to see the sky. This is so obviously an effect of a radiation screen, of back-radiation from the roof to the men that is reduced in proportion to the amount of roof opened up and the height of the roof, that the argument about it is rather surprising. Mr. Yould put it down to a psychological effect, but he was dead right in maintaining that such a device could not be relied upon for *ventilation*. Nor could the frequently seen arrangement shown in Fig. 1, nor any system which presented a different aspect to different winds, or which let in rain and snow and had to be closed in inclement weather.

A good word was put in for the continuous ridge ventilator, which is little affected by wind, but full marks were given to a circular extractor designed for ridge mounting and shown in Fig. 2. The suction band *A* prevents a horizontal wind from blowing into the stack and wind baffle *B* prevents the entry of upward currents off the slope of a roof. The ventilator is manufactured of protected metal, resistant to corrosive atmospheres. Its performance is predictable, being given by:—

$$Q = S\ [10.82\ (HT)^{1/2} + 30.75\ V]$$

Where Q is in cfm, S is the throat area in sq ft of ventilator chosen, H the height in ft above the fresh air inlets, T the mean temperature difference in °F, and V the wind velocity in mph.

An interesting application to buildings in Calcutta (which is on a latitude with Tampico in Mexico) is shown in Fig. 3. The air between roof and insulated ceiling is heated by the sun, and the ventilators are of a size calculated to provide 15 air changes an hour. The air temperature in the living-space can be kept down to within a degree of outside shade temperature.

Radiant and Convection Heating for Factories

W. R. Cox, Director of a London firm, appears to have been called in more often to supply heat to buildings than to prescribe cheap ways of removing hot air. In his experience the problem in many industrial buildings is to prevent and not create air change; the losses through imperfect building structure and opening doors often give in winter an air interchange considerably in excess of that required by the occupants. It is therefore no argument in favour of a system of heating that it promotes air movement. It does not seem right to choose a heating system for its advantages as a cooling system. If additional air movement is wanted in summer, fans are cheap.

The subject of his paper was Radiant Heating Methods. Floor warming he considered to be excellent in principle, but difficult to apply in a factory because one could never predict which parts or how much of the floor would be covered with plant or material. For any sort of heating by radiant panels there is the general rule that the larger the area and the lower the temperature of the heat-emitting surface, the better the results. Capital costs limit this. In practice, medium-pressure or high-pressure hot water was probably the most satisfactory heating medium, used in flat-faced panels or in strip-heating.

The increasing tendency to calculate the heating requirements of buildings by reference to mean radiant temperature was handicapped by the absence of a general method for dealing with large buildings of light construction. The nearest approach was that of White (Jour. I.H.V.E. **20**, *208*). Standard methods of calculating heat requirements give good results provided attention is paid to the separate losses through floor, walls and roof and the heating surfaces are balanced to correct these. The air-warming that takes place by convection at a surface installed for radiant purposes is useful in counteracting losses at higher levels in the building and in preventing downdraught. It is possible to keep vertical temperature gradients to very low values say of the order of 2 degrees in 40 ft.

In suitable types of building strip heating had much to commend it. The strips consisted of pipes carrying hot water and plates in contact with them radiating downward. They should be insulated on top, and perhaps have a reflector also. In the discussion on this paper, Mr. Bruce put in a word for pipe coils, particularly if convection from them was restricted. Mr. Molinari had the problem of providing heating for one man in a lightly constructed factory building of 100,000 cu ft, and some attempt at spot radiation seemed to be the answer. Mr. Cox light-

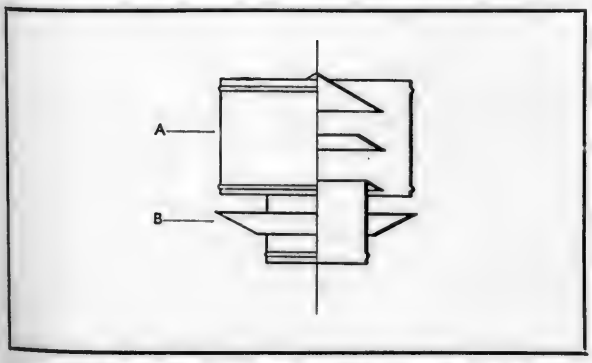


Fig. 2. Circular ventilator designed for ridge mounting.

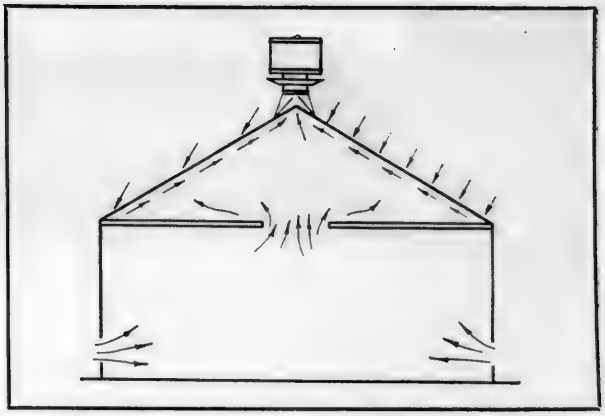


Fig. 3. Roof ventilator arrangement used in Calcutta.

heartedly suggested this was a case for an electrically-heated suit with plenty of plug-in points.

Convective Heating Methods was the title of the paper by E. A. Pearce, a consulting engineer. He also had a good word to say for pipe coils, particularly for small factory premises. Since Britain apparently has nearly 200,000 factories employing less than 10 persons each, their needs are important.

Other methods employing the convective principle were dealt with summarily and without enthusiasm before the author went on to unit heaters. Even here, his approach was a description of the various types and methods of installation if one wished to use them—not an argument for the defense. Even in the discussion there was a spirited action in favour, not of convective heating, but of gas as a fuel; Mr. Pearce (whose offhand treatment of gas-heated appliances had brought on the attack) brushed it aside with the remark that gas was too expensive anyway.

Granted that some warming of incoming fresh air may at times be needed, radiant heating won the day, largely on the ground of fuel economy. As for installation, nobody suggested 3-inch pipes above the working area with aluminum reflectors over them, but this would seem to be difficult to improve upon economically.

(*Continued on page* 152)

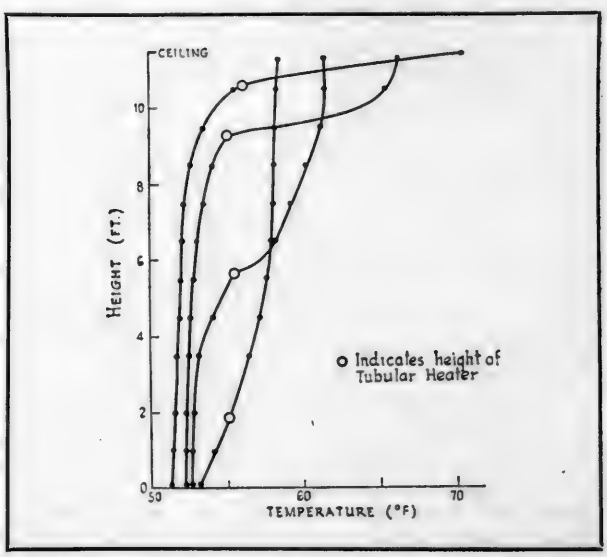


Fig. 4. Temperature gradients in the Controlled Weather House for various vertical locations of the heater.

Experience is my Classroom

By T. W. REYNOLDS

• SAVINGS THROUGH PIPE SIZE REDUCTION

Results are surprising when one sufficiently interested takes the piping plans of a large industrial plant or multi-story building and reduces pipe sizes that were fixed by the usual hurried method. Mounting costs warrant a more reasonable length of time for pipe sizing. Even though some few of the points which follow may be considered drawn rather fine and some of the others difficult to evaluate, the additional time taken is but a fraction in value of the material, heat and other things thereby conserved. Manufacturers of the more expensive materials used in distribution systems eventually found it necessary to widen use of their materials to promote the use of lighter and smaller pipes or ducts of limited length and higher velocities of flow. Substantial savings in housing and other developments resulted.

Multiple identical units in an industrial plant is another case where reduction in size of piping connections to a safe minimum is worthwhile. Special consideration should be given when the pipe used is more expensive due to galvanizing, the use of corrosion resisting material, or thicker wall construction, or where size reduction would fall below any size calling for flanges.

Standby or emergency-use piping is one of the places where size can be greatly reduced, considering short duration of use. Compressed air piping is still another field for such study. Some size such pipe liberally because of storage gained, not realizing that storage by pipe is so small it can be more cheaply gained by tank storage and with less air leakage. Sometimes air pipes are needlessly sized for larger air volume due to temperature rise from compression, although such rise is soon lost in a short distance of pipe travel, even without an aftercooler.

Often piping is liberally sized in a very careless manner simply as a matter of no consequence, and with the thought of "Let is be so sized as a factor of safety (ignorance), or to take care of some possible future load," even though design loads are both liberal and coincidental and with the larger commercial pipe size selected for border line loads. Supposing, however, that a size has been fixed in a less thoughtless manner, what then are the disadvantages of reduction from this size? They are few and can be overcome in most cases in various ways. For example, smaller pipe sizes, if dealing with small pipes, and particularly with those where inside diameter is decreased by thicker walls, tend in time to even smaller area from accumulated scale and also to waterlog, even though they have less surface to produce scale and less heat loss to cause condensation. Again, if small enough, they tend to sag, but this can be met by the use of more hangers. In any event, hangers can be lighter and in some cases with larger sizes of pipe, a reduction in their size will eliminate any need for expensive roller supports.

The most valid objection to the use of smaller pipe concerns increased resistance to flow. This, too, can be often overcome, say by the use of superheat or slightly higher pressures and temperatures. Higher pressures means a slight increase in heat losses (although from a smaller amount of surface) and a reduction in latent, but steam volume is very much reduced. For superheat, the heat conveyed is greater, dryer and with less heat losses. With no wetness in the steam, smaller pipes can be used. Incidentally, the length in feet to be added to actual length of pipe run (owing to valves and fittings) to obtain equivalent length of run for resistance, is less as pipe size decreases.

Although it is sometimes in keeping with desired appearance to pipe close along walls and to embrace projecting columns, yet pipe runs can often be made more direct using less fittings. Expansion loops, for example, have less resistance than 90 degree directional change even though they add more linear feet of piping. Again it may be possible to shorten pipe runs by locating industrial steam-using equipment nearer the source of supply.

Condensate and drainage lines can be reduced in pipe size where it is practical to obtain greater pitch, providing at the same time less tendency to water hammer. Sometimes it is more practical to use pumped returns, in which event smaller pipe is used than with gravity returns and less heat is lost because of intermittent flow. Unit heaters also reduce piping quantities. Finally, reduced flow (therefore less resistance) will be obtained by the lessened pick-up load of pipe metal. If peak of loads come on at different times, less boiler capacity is required, providing an operation more efficient for the boiler.

Smaller pipe size means less perimeter at joints for possible leaks, less metal surface of pipe susceptible to corrosion, therefore less scale, cleaning and water treatment and less need for strainers. Less space is required for chases, pipe shafts, furred ceilings and piping around equipment. Compact arrangements are made possible where smaller pipes can be used with bypasses and valves with smaller diameter wheels and shortened stems. Smaller valves can be more quickly operated. Load on the structure is lessened.

Smaller sized pipe is more flexible to take expansion, is better appearing, quickly heats and cools, reduces heat losses, and most important has less air to remove. Air delays pick-up, reduces heat transfer in equipment and has other disadvantages. Pipes small enough in size can be left bare if the heat is used when and where wanted. Larger pipes often require fans for heat removal.

Other savings are more obvious, such as smaller fittings, strainers and specialities, while costs for piping, insulation material and labor, interest on investment,

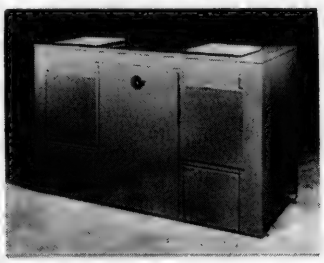
(*Continued on page* 152)

NEWS OF EQUIPMENT AND MATERIALS

Use the prepaid postcard opposite page 132 for securing additional information on items described in this department.

Air-Cooled Air Conditioner

Introduction of a five hp air-cooled packaged air conditioner is announced by Airtemp Div., Chrysler Corp., Dayton, Ohio. Designated Model 1205, it is designed principally for areas where water supplies are inadequate or costly, or where sewer taxes add appreciably to the cost of air conditioning.



The air conditioner measures 58 inches wide and 35 inches high. The 28-inch depth allows easy passage through standard door frames. In commercial stores, it can be located outdoors or in non-merchandising areas.

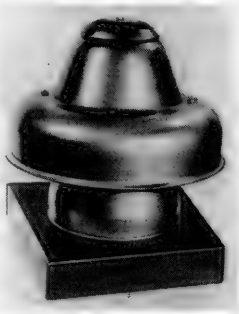
Applicable to larger homes, the unit may be installed in utility rooms, basements, breezeways, garages or outside the home. The air conditioner is designed for use with any one of six evaporator coils or evaporator-coil-blower assemblies produced by the company, depending on the particular application.

Condenser blowers may be rotated 90 deg for air discharge through either the side or top of the unit. All necessary controls are wired and built in at the factory. The unit features the company's 1750 rpm hermetic compressor. The refrigerant is Freon-12.

More information? Circle Item 1 on postcard, page 132

Power Roof Ventilator

A line of aluminum power roof ventilators is announced by W. R. Carnes, Co., Verona, Wis. The models feature all-aluminum construction, attractive appearance and a low silhouette. An important safety feature is non-sparking fan wheels as standard equipment at no extra cost. Backwardly-inclined centrifugal fan wheels in sizes from 4 to 36 inches provide capacities from 100 to over 15,000 cfm, while axial flow fans in sizes from 10 through 36 inches give capacities from 400 to over 17,000 cfm. The range of motors is equally wide, assuring the correct unit in any application.



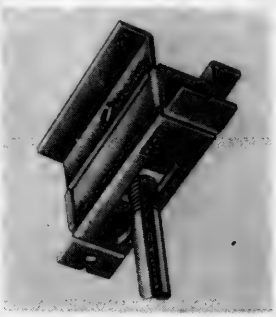
The accessories available for these ventilators includes automatic and motorized back draft dampers as well as bird screens. All models of ventilators can be supplied with acid coating.

Catalog 5054 describes the line in complete detail.

More information? Circle Item 2 on postcard, page 132

Spot Concrete Insert

A new spot concrete insert, designed for quick suspension of piping, electrical conduit, and heating and ventilating ducts, is announced by Unistrut Products Co., Chicago, Ill. The insert combines quick installation with adaptability to various types of hanger connections. It takes any square or hex head nut, bolt or hanger up to ½ inch and support up to 1000 lb.



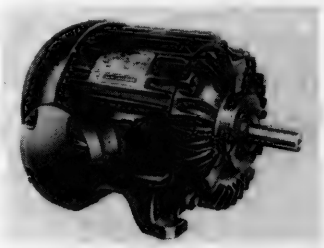
Centered side-holes take reinforcing rods up to ⅜ inch. Drilled holes are provided for quick nailing into wood forms. A keyhole slot permits 2-inch hanger adjustment for perfect alignment and special V-slots at either end for easy lining up and centering.

Specifications for the new insert give the length as 4-5/16 inches, width 2¼ inches, and height 1⅝ inches. The keyhole slot entrance measures 29/32 inch wide and ⅝ inch long, while the slot itself measures 17/32 inch wide and 2 inches long. The spot insert weighs .54 lb each. The material is 12 gage cold rolled steel. Standard inserts are unfinished, but may be obtained in green enamel or galvanized. Load capacity is 1000 lb in average good concrete with a safety factor of three.

More information? Circle Item 3 on postcard, page 132

Redesigned Motors

Equal horsepower in a smaller package is a description of the new line of motors put out by Allis-Chalmers Mfg. Co., Milwaukee, Wis. Redesigned to conform to the NEMA rerate program, the new motors, designated Type G, retain all the important features of the company's AP line while offering certain improvements, such as the intake openings having far greater protection than in the old design. Located in the bottom half of the end shield, these openings are high enough above the base to minimize intake of dust and lint from the floor.



All continuous rated totally-enclosed motors of the new Type GZ and Type GZZ (illustrated), including the smallest horsepowers, are fan-cooled.

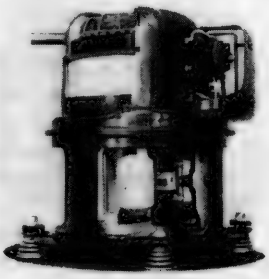
The new models have cast iron frames and end shields, and rotors are of pressure cast aluminum. Double shielded ball bearings are medium series, grease-lubricated, and capable of relubrication without dismantling the motor. Stator windings are the random or mush wound type of heavy Formvar-coated wire in semi-closed slots.

The company is now in production on frame sizes 182 and 184. Larger frame sizes will be available at five month intervals.

More information? Circle Item 4 on postcard, page 132

Compressors for Conditioners

Twin-cylinder type welded, hermetic motor compressors for window air conditioners by Copeland Refrigeration Corp., Sydney, Ohio, run smoother and have a lower noise level, according to the manufacturer. All rods and bearings are made of solid bronze for longer wear, and the one-piece casting insures positive alignment of motor and bearings.



A cork alignment ring controls the air gap surrounding the motor to reduce noise, yet keeps the motor close to the shell, permitting fast heat transfer to overload for positive protection. Motor starting relays are current-type on the ½ hp and light ¾ hp, potential-type on the heavy ¾ hp and 1 hp. A sensitive 3-terminal type overload protector is furnished. Counterbalancing the crankshaft minimizes vibration.

Suction and discharge mufflers are built in. The large suction muffler has low pressure drop. Suction and discharge reeds are Swedish steel. The oil pump will operate efficiently when rotating in either direction.

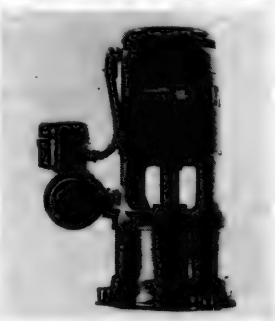
The company states that the use of F-12 in these motor-compressors results in 75 deg F lower temperature in motor windings, crankcase, oil and discharge side than that obtained with motor-compressors using F-22.

The company supplies the welded, hermetic motor-compressors in 4 sizes designed for window air conditioning units. These motor-compressors are an addition to the line of semi-hermetic models, which will continue to be supplied in sizes from 1/6 to 7½ hp for applications where their special features are more desirable than a welded type unit.

More information? Circle Item 5 on postcard, page 132

Multi-Stage Brass Pumps

A group of multi-stage brass pumps designed for both deep and shallow wells and known as the Rapidayton Super Champ Multi-Stage Brass-Built pumps, is announced by Dayton Pump & Mfg. Co., Dayton, Ohio. They employ the axial flow principle developed by the company.



All pumping parts, including the ejector body in the deep well models, are made entirely of brass. This brass-built internal construction prevents corrosion.

The pumps come in two or three stages and in ½, ¾, 1, 1½, and 2 hp. models. All are equipped with heavy-duty capacitor start NEMA standard motors.

Deep well units are available for settings up to 200 ft. with two-pipe jet assemblies for wells 4 or 5 inches or more in diameter, and single-pipe jet assemblies for smaller wells. Shallow well units are the straight centrifugal type and do not require a jet assembly.

Pumps and ejectors can be bought separately or as complete systems including vertical pressure tanks ranging in sizes from 28 to 220 gals. Prices for pump and ejector begin at $149.50 retail.

All pumps have cartridge-type rotary seals, easily accessible and requiring no special tools to change.

More information? Circle Item 6 on postcard, page 132

Extruded Tubing, Fins Integral

An aid in the solution of unusual problems of heat transfer is the tubing with integral fins on the inside surface produced by The Babcock & Wilcox Co., Beaver Falls, Pa.

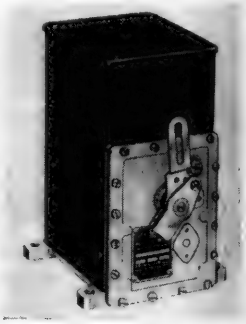
With fins on the inside or outside of the tubing the surface area is greatly increased, thus permitting a greater transfer of heat in a tube of a given length and diameter. Tubing with ID fins is produced from a special heat resisting stainless steel. It is used in a heat exchanger with fire on the outside and gas on the inside.

The production of such specialties has passed the purely experimental stage and similar tubing can be produced from a number of steels in a limited size range.

More information? Circle Item 7 on postcard, page 132

Heating-Cooling Controls

A package electronic heating-cooling control for use in commercial buildings is announced by Minneapolis-Honeywell Regulator Co., Minneapolis, Minn. An electronic relay and the companys' Modutrol motor (upper illustration) are combined into a single unit costing about 20% less than systems requiring a separate motor and relay. Installation costs are also greatly reduced.



The combination unit is suitable for use in a relatively simple heating-cooling installation requiring only one indoor thermostat and a sensitive Weathercaster thermostat (lower illustration) which is mounted either outside the building or in the outdoor air intake.

It can also be used in large zoned systems where signals from several electronic thermostats must be coordinated by the relay to actuate the motor valve or damper.

In either type of installation the electronic system provides accurate and fully-automatic temperature adjustment according to changes in outside weather conditions as well as such factors as occupancy of the building, prevailing winds, sunlight or shade.

More information? Circle Item 8 on postcard, page 132

Rotary Masonry Drills

A price reduction applying to its rotary masonry drills in sizes up to and including 1-3/16 inch diameter, is announced by Termite Drills, Inc., Pasadena, Calif.

The drills are available in standard diameters from 3/16 to 5 inch and are available up to 8 inch diameter on special order. Lengths up to 36 inch are obtainable. These drills are used with standard electric or air motors. A recent improvement in the company's drill includes a specially-designed collar, which is standard on all drills of 7/8 diameter or larger. This collar facilitates the changing of shanks when different lengths of drills are desired. All drills of 7/8 inch diameter and larger have interchangeable shanks.

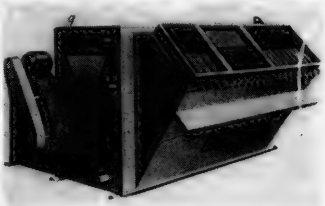
A feature of the drill is the worm which starts right at the grinding inserts, withdraws the pulverized residue from the hole, and carries it away the instant it is pulverized. This feature means faster and easier drilling and cleaner, more accurate holes. The grinding inserts used on the company's drills are made of exclusive material composed of vacuum sintered tungsten titanium carbide which gives longer drill life and faster penetrating qualities.

A catalog showing new prices and complete information on all lengths, diameters and recommended uses for the company's rotary masonry drills is available.

More information? Circle Item 9 on postcard, page 132

Flexible Air Conditioner

An air conditioning unit, known as the Flexazone central-plant air conditioner, is available from Drayer-Hanson, Inc., Los Angeles, Calif., for multi-room building applications where independent, variable cooling and heating are desired. Consisting of three major parts, blower section, coil section, and damper section, the unit can be field-assembled in 24 different ways, and a new-type damper arrangement makes it possible to add or change zones at any time. A choice of either horizontal or angular air flow is also offered.



Incoming air is blown past the heating-cooling coils, and is discharged through the individually-controlled dampers in separate air streams in varying temperatures. Cooling coils for use with water or direct expansion refrigerant are furnished in a wide variety of tube quantities. Standard steam coils are available for heating.

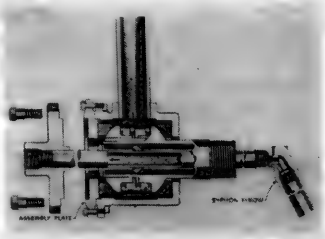
Other features include: galvanized steel panels for greater corrosion-resistance; vinyl-coated glass wool insulation, for improved sound absorption, moisture-resistance, and resistance to vermin and fire; and automatic pressure-relief grease fittings, to prevent destructive over-lubrication of bearings. All damper controls are mounted on a shelf outside the unit, and extra-large, rubber sealed doors are on each end of the unit.

Equipment is available in eight models, with capacities ranging from 1,300 to 24,000 cfm.

More information? Circle Item 10 on postcard, page 132

Syphon Elbow, Assembly Plate

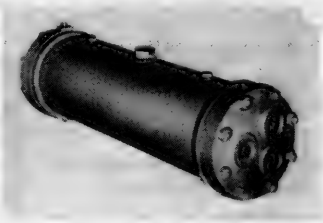
Two developments are announced by Johnson Corp., Three Rivers, Mich., for reducing maintenance time in the insertion and removal of mechanical syphon pipes in rotating rolls or drums that require the insertion of steam or other liquids and the removal of condensate. The redesigned Type J rotary pressure joint is available with a special assembly plate which serves to hold the internal parts of the joint in position when the head is removed. The syphon pipe can thus be removed without disturbing the joint proper or the steam inlet connection. All Type J joints, 1 inch and larger, are designed so that assembly plates can be added at any time. In addition to the assembly plate, another new product of the company is a hinged syphon elbow. Two straight pipes may be threaded to this elbow, eliminating the need for a curved pipe serving as a mechanical syphon pipe. As the first pipe is inserted in the roll or drum, its weight closes the elbow, which enables the stainless steel seat to create a closed line that is both leak proof and pressure proof. The chore of carefully inserting a curved pipe is thus eliminated.



More information? Circle Item 11 on postcard, page 132

Condensers for Refrigerants

A line of standard condensers for fluorinated hydrocarbon refrigerants, commonly known as Freon and Genetron, is announced by Doyle and Roth Mfg. Co., Brooklyn, N. Y. The condensers are made in two types, the Series DRSM for marine type installations and the Series DRS for industrial use. The dimensions and capacities of both types are identical and range in size from 5 tons to 120 tons nominal rating.



The industrial type is fabricated from seamless steel pipe with copper finned tubes, and the tube sheets are flanged quality carbon steel. Water heads are cast iron designed to furnish either two or four pass water distribution. The design pressures are 200 psi on the shell side and 100 psi on the tubes.

Marine type condensers are equipped with either cast iron or bronze heads as desired. The tube sheets are 20% monel clad and the tubes are low fin 90/10 cupronickel.

More information? Circle Item 12 on postcard, page 132

Line of Air Conditioners

The 1954 line of room air conditioners of York Corp., York, Pa., is enlarged to 18 models, the widest selection the company has ever made available in a single year. Prices are about 13% lower than those of last year.

The ⅓ hp. conditioner has 4-way adjustable air distribution grilles and heavy duty disposable type filters that are easily reached without having to remove the cabinet from its mounting. The motor has external starting relay and overload protection, and a centrifugal blower type evaporator fan, built for quiet operation. This model is available for houses, hotels, offices and hospita's and incorporates many features of the larger models with the exception of heating and modulation control.

The ½ hp. size (top view) comes in two styles designed for hotels, motor courts, average size rooms and offices. The ¾ and 1 hp. units (lower view) are available in nine and four models, respectively, and are designed for larger rooms.

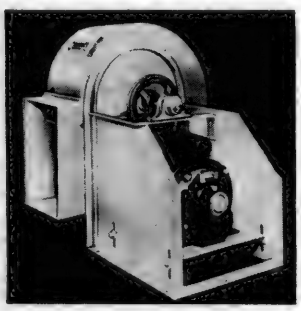
The 2 hp. console type conditioner is equipped with step-matic control, which functions as a humidity balancer, Self contained, this unit is designed for commercial establishments and can be equipped with duct work attachments for air conditioning multiple areas.

More information? Circle Item 13 on postcard, page 132

Blower for Corrosive Service

Two lines of exhaust blowers protected for corrosion and abrasion service are announced by Heil Process Equipment Corp., Cleveland, Ohio.

A compact, self-contained coated exhaust fan set (illustrated), designed for services ranging from simple ventilating to handling of moderately corrosive atmospheres, is available in blower capacities from 300 to 7000 cfm. For service with corrosive elements, units are supplied with either baked phenolic, vinyl or tough latex coatings to resist a wide range of chemicals including organic materials.



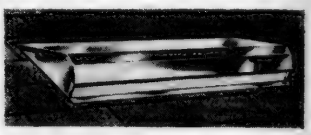
A line of heavy-duty rubber covered blowers for service in severe corrosive or abrasive conditions is available in blower capacities from 750 to 54,000 cfm. Units are protected against fumes of sulfuric, hydrofluoric and other rough mineral acids by application of one of several types of high grade rubber including natural and neoprene, depending on service requirements. Paddle-type fans are dynamically balanced for smooth operation and maintain efficient suction at hoods despite varying static losses in the over-all system.

The addition of these exhaust blowers gives the company a complete line of ventilating equipment for corrosive atmospheres, including the necessary engineering facilities. It regularly produces either lined steel exhaust hoods and ducts, or exhaust hoods and duct systems constructed of Rigidon, glass reinforced plastic, or Rigivin, rigid vinyl type plastic.

More information? Circle Item 14 on postcard, page 132

Slant Roof Ventilator

A large size slant roof attic ventilator with 120 sq in of air opening is offered by Leslie Welding Co., Inc., Chicago, Ill. Although it has an unusually large air opening, the SR 40-3 Series vent is low in height to provide an inconspicuous appearance on the roof. Designed to fit shingled roofs of any pitch, the ventilator is flanged, baffled and screened to make an easy installation that is weathertight and insectproof. In addition to the 3 inch flashing all around, it has a narrow auxiliary over-flashing or drip cap at the bottom of the opening which is forced down over the shingle ends, assuring a permanent weathertight seal. The deep baffle is an efficient separator of water and air, even when rain or snow is driven into the opening by a high wind.



The ventilator is made in galvanized steel, aluminum, and copper.

More information? Circle Item 15 on postcard, page 132

2-3 Ton Air Conditioners

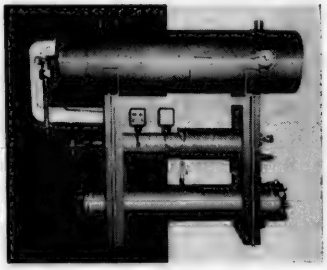
A ceiling model air conditioner, known as the O series, self-contained air conditioning unit featuring a hermetically-sealed compressor, the capillary system, and inexpensive throw-a-way filters, is announced by Barkow Mfg. Co., Milwaukee, Wis. As in the case of other of the company's air conditioners, the 2-ton unit exceeds its rated capacity, producing 28,000 Btu per hour which is 4,000 Btu per hour over its required output.

The unit can be mounted to the ceiling or installed in the attic. It is designed for free discharge or attachment to a duct system. Available in 2 or 3-ton sizes with or without blower, it is shipped completely assembled, ready for fast, simple installation.

More information? Circle Item 16 on postcard, page 132

Adaptable Packaged Chiller

A line of packaged chilling units in larger sizes than its Flow-Cold and Flow-Temp units is announced by Acme Industries, Inc., Jackson, Mich.



This latest product to be added to the company's line is the Flow-Therm packaged water chiller, which is designed to permit the user to tailor the unit to his exact job requirements from proven, job-tested equipment and selection procedures, retaining the advantage of the factory package. Since the unit is shipped from the factory without compressor, it can be used with the compressor best suited to the particular job.

This chilling unit is adaptable for heat pump use on larger installations. Capacities range from 15 to 220 tons.

More information? Circle Item 17 on postcard, page 132

Lightweight Stainless Tubing

A high strength, thin wall stainless steel tubing has been developed by Flexonics Corp., Maywood, Ill., for industrial uses where corrosion resistance, light weight and special shapes or bends may be required. The company engineers special applications of the tubing in combination with fittings and its own flexible tubing or expansion joints.

The company makes both standard and high strength stainless steel straight wall tubing. The latter gains greater yield and tensile strength for the same wall thickness through a work-hardening process. This also makes the tubing more crush-resistant, due to higher temper of the metal. Substantial weight and material savings are effected by the high strength over the standard.

The standard straight wall tube is available in fifteen outside diameters ranging from 1 to 6 inch. The high strength comes in thirteen outside diameters, from 1.50 to 6 inch. All but the smaller sizes are available in four wall thicknesses designed to withstand various pressures. The 1.50 inch size in high strength, and the 1 and 1.25 inch sizes in the standard are made in three different wall thicknesses. On special order, the company will supply diameters, wall thicknesses and tolerances other than those shown in specifications. Ordinarily, tolerances are plus or minus .002 or .003 inch.

Fittings and component parts can be attached to the straight or flexible tubing by resistance circumferential seam welding. This has been particularly valuable in aircraft applications, where expansion joints and sections of flexible hose must absorb movement and compensate for accumulated tolerances under severe pressure and temperature conditions.

Through stainless steel, it is possible to make assemblies more leak-proof by eliminating the porosity of castings. Where some unusually-shaped parts were formerly made from two or more pre-shaped shells of stainless steel, brazed together (illustration), the corporation is forming them from a single piece of tubing (illustration). This does away with a source of potential weakness, the brazed joint, which is a weak link corrosion-wise and cannot stand the high temperatures of the stainless steel sheet.

More information? Circle Item 18 on postcard, page 132

Rigid Polyvinyl Chloride Tubing

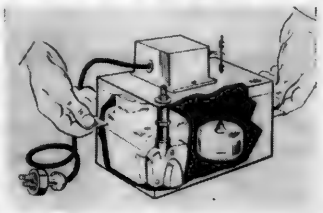
Rigid polyvinyl chloride tubing and ducting in 6, 8, 10, and 14 inch inside diameters are offered by Kaykor Industries, Inc., Yardville, N. J. Tradenamed Vyflex, the tubes and ducts are furnished in 4 ft straight lengths that can be joined to produce multiple pipe-length installations.

Made of completely unplasticized and unmodified polyvinyl chloride, the tubing and ducting are ideal where severe corrosive conditions prevail and where large diameter sections, such as in waste systems, exhaust ducts, and feeder lines, are called for. The material is the same as that used in the company's rigid plates and sheets.

More information? Circle Item 19 on postcard, page 132

Miniature Condensate Pump

A miniature condensate pump has been developed by Samuel S. Gelber Co., Chicago, Ill. An automatic pump measuring only 5 by 8 by 5 inches, it is designed for removal of condensation in mechanical refrigeration and air conditioning units, and is compact enough to be incorporated in original equipment.



The motor is hermetically sealed in oil and cannot become wet from dripping water or condensation. It has glass insulated terminals, and the neoprene seal is housed in stainless steel. All external screws are of stainless steel as well. The pump case is die-cast aluminum with baked on plastic coating. The pump develops 4 psi, has a shutoff head of 9½ ft, and discharges 180 gph at 1 ft head, 158 gph at 2 ft, 115 gph at 4 ft, 72 gph at 6 ft and 28 gph at 8 ft.

The copper float and electric switch actuate the pump as condensation rises in the container. Water is pumped up and out to the nearest drain until the tank is empty. The float switch cuts off automatically and the ball check in the discharge line prevents water that has been pumped out from returning.

More information? Circle Item 20 on postcard, page 132

Diffuser In Suspended Ceiling

Designed to fit into the suspension system, the ceiling air diffuser developed by Connor Engineering Corp., Danbury, Conn., is interchangeable with the acoustical tile and the lighting fixture. It has a flexible duct connection to make it easily removable to any position. Installation is simple; the diffuser goes up like the tile and is clamped to the tubing in minutes.

The architect can now specify a complete ceiling that is attractive and low in cost. The design engineer can avoid the calculations imposed by fixed outlets and rigid connections. The owner has the assurance that his air conditioning system is flexible enough to meet any office layout revisions. The maintenance engineer has ready access to ceiling-concealed service lines.

The metal and plastic tubing can be twisted, stretched or compressed and still retain the same diameter, making alignment of duct and diffuser unnecessary. The diffuser can be offset to the next bay. The tubing does not support combustion, nor does it add to the noise level.

The diffuser fits snugly into the tile to form a harmonious plane, and the sleeve damper does not extend beyond the neck or collar. Regardless of the position of the damper, tip velocity of the discharged air remains constant, and varying the air supply of the unit has no appreciable effect on the diffusion pattern. A simple tool operated from the floor opens or shuts the damper.

Recommended for both conventional and high pressure design, this diffuser is available in 4, 5 and 6 inch neck sizes, with capacities of 75 to 175 cfm.

Ask for Bulletin K-36.

More information? Circle Item 21 on postcard, page 132

Console Type Air Conditioner

A new console type air conditioner, to be known as the Airditioner, is announced by Modine Mfg. Co., Racine, Wis. Available in three sizes with nominal cooling capacities of ⅔, 1½ and 2 tons, the conditioners are designed for the cooling, heating and ventilating of individual rooms in hotels, apartments, motels, office buildings, schools, hospitals and residences.

Chilled water is used for cooling; hot water for heating. Each unit is served by three pipes—water supply and return, and drain. Outside air for ventilation is introduced through an aperture in the rear of the unit. Adjustment of a manually operated damper controls the mixture of fresh and recirculated air.

Finished in a marine green baked-on primer, which was selected because of its high resistance to moisture, the unit is suitable for use without further finishing. It is adaptable to either fully exposed or partially recessed installation. Edges at the junctions of top and sides are square, extending forward to almost half of its depth. This permits the unit to be recessed up to five inches, with less than six inches protruding into the room.

All units are provided with air filters, adjustable fresh air mixing dampers, three-speed motor control, high capacity reversible coil, twin access doors and manually removable enclosure fronts.

Illustrated descriptive bulletin No. 754 together with engineering data are available on request.

More information? Circle Item 22 on postcard, page 132

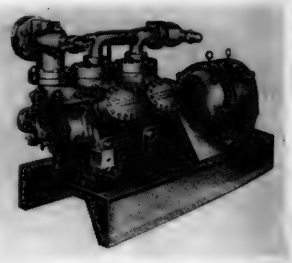
Heating and Cooling Units

The line of Winkler heating and cooling units of Stewart-Warner Corp., Lebanon, Ind., is augmented by a series of oil and gas furnaces and boilers; a gas conversion burner; round gravity and square forced air furnaces to burn oil, gas or coal; central air conditioning units in 2- and 3-ton capacities; room air conditioners ranging from ½ to 1 hp.; and a line of domestic and commercial gas and electric water heaters.

More information? Circle Item 23 on postcard, page 132

Reciprocating Compressor

A 12-cylinder, 75 to 100 hp reciprocating compressor for air conditioning and refrigeration duty, featuring simplified installation and compactness, is announced by Carrier Corp., Syracuse, N. Y. The latest of 18 different reciprocating compressors made by the company ranging from 3 to 200 hp and offering 43 different capacities is designed for use at air conditioning temperature levels, for commercial or industrial refrigeration applications, or for ultra-low temperature work down to minus 100 deg. F.



Features include a special oil separator and control system which eliminates oil from the refrigerant circuit and prevents loss of oil on starting, full flow oil filter, and new type shaft seal. The compressor automatically adjusts itself to varying loads. Changes in oil pressure depending upon refrigerant temperatures actuate capacity control mechanisms.

An external oil cooler may be attached if the compressor is to be used for low-temperature refrigerating application. The cooler helps maintain low discharge refrigerant temperatures.

The compressor can be used with three different refrigerants, Freon 12, Freon 22, or Carrene 7, depending upon the application. Models adaptable for ammonia will be available this Spring.

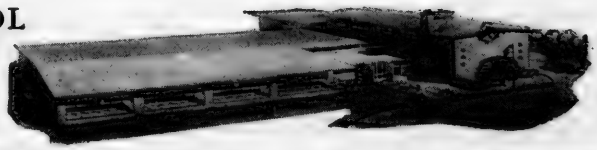
More information? Circle Item 24 on postcard, page 132

(*Continued on page* 126)

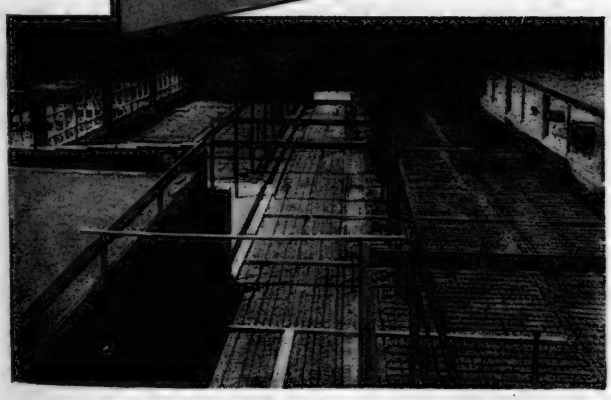
MANCHESTER ELEMENTARY SCHOOL

Manchester, Missouri

Architect: CHARLES W. LORENZ, Kirkwood, Mo.
Contractor: JUENGEL CONST. CO., St. Louis, Mo.
Radiant Heating: BAGLEY & COMPANY, Inc., Robertson, Mo.
Revere Distributor: GRINNELL COMPANY, Inc., St. Louis, Mo.



Another case of COPPER where it counts!



TWO VIEWS of the radiant Panel heating layout before concrete slab was poured. Floor area over 17,000 sq. ft. System was imbedded in slab 4". Gravel fill is 6" deep. Coils are 12" OC. System is divided into 4 zones, with all supply and return lines also of copper. Note edge insulation at right in large photo.

Radiant Panel Heating fits perfectly into the growing trend to 1-story school construction. It means warm floors, no drafts, and a healthier atmosphere for scholars. To the architect radiant panel heating means greater latitude in design, more usable space for the money. And for the user it means greater heating efficiency, lower redecorating costs and less cleaning and maintenance than when old-fashioned heating methods are used. The ideal material for panel heating is copper. For no other metal or alloy has all the desirable construction characteristics of this "ageless" metal.

To the contractor, the use of Revere Copper Water Tube means easy bending and handling . . . its long 60' lengths require fewer fittings, the solder fittings used eliminate the need for welding, wrench work and thread cutting, while its lasting, non-rusting qualities have been proven through the centuries. Even being buried in a concrete slab doesn't bother enduring copper. Copper is the metal you can trust.

Keep out of trouble, protect your reputation for quality work . . . use Revere Copper Water Tube for air conditioning lines, radiant panel heating, hot and cold water lines, underground service lines, waste stack and vent lines, processing lines. See the Revere Distributor nearest you today. And, if you have a technical problem, he will put you in touch with Revere's Technical Advisory Service.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

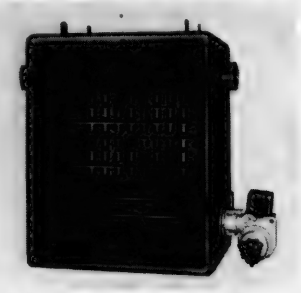
Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.—Sales Offices in Principal Cities, Distributors Everywhere.

SEE "MEET THE PRESS" ON NBC TELEVISION, SUNDAYS

(*Continued from page* 124)

Suspendible Oil Unit Heater

A new unit heater fired with a conventional gun-type oil burner is introduced by Certified Furnace Corp., Trenton, N. J. Model UH-220 has many outstanding features. Its vertical flue travel permits the products of combustion to be exhausted into the atmosphere through a short flue pipe without the use of a high-draft permanent chimney. The burner and flue outlet can be attached to either side of the unit heater.



Hanging hooks are provided for suspending the unit from the ceiling and four ½ inch bolt holes on the bottom of the casing permit attachment to a portable platform or dolly when heating temporary buildings, outside loading platforms, or spot locations. The louvers in the front of the furnace are adjustable to vary the direction of the heated air

Heat output is 220,000 Btu per hour when fired with a 2 gph nozzle. A large ½ hp propeller fan and motor throw heated air for an effective distance of 50-75 ft, and air delivery is 5,730 cfm. Despite its high heat output, the heater is light in weight, only 390 lb complete with burner and controls. The height is 49½ inches, width 39 inches, depth 21 inches. It is factory assembled and shipped with all controls wired.

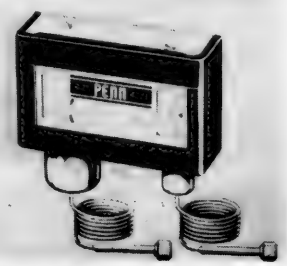
The heater permits savings in installation and heating costs for commercial use, industrial buildings and service stations, and is particularly adapted for heating problems requiring multiple units. Each unit is an integral heating plant in itself, thermostat controlled. With multiple installations a building can be heated with fewer units operating as the outside temperature increases.

More information? Circle Item 25 on postcard, page 132

Dual Pressure Control

A dual pressure refrigeration control, with lockout requiring manual reset on both high and low pressure, is announced by Penn Controls, Inc., Goshen, Indiana. Designed as a safety control for all mechanical cooling applications, it is specifically recommended for hermetic units for air conditioning.

The control is available in either single pole standard duty (Type 271AP12AP illustrated) or double pole heavy duty (Type 273BP12AP) and for systems using either F-12 or F-22 refrigerants. Both types incorporate simple screwdriver adjustment and direct-reading calibrated scales.



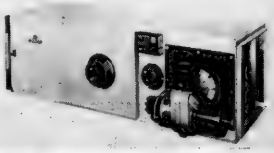
Controls for F-12 have a low pressure cutout range of 20 to 50 lb and a high pressure cutout range of 100 to 240 lb. Controls for F-22 have a low pressure range of 20 to 80 lb and a high pressure range of 175 to 375 lb. Standard duty models are rated for 1 hp single phase; heavy duty models to 1½ hp single phase or 3 hp polyphase (where protection against single phasing is provided).

Controls are equipped with 36 inch copper capillary on both high and low pressure connections. ¼ inch flare nuts are furnished as standard; a ¼ inch flare or sweat connection is furnished when specified.

More information? Circle Item 26 on postcard, page 132

Horizontal Air Conditioner

A horizontal oil fired winter air-conditioner with a 90,000 Btu per hour output is announced by Mayflower Air-Conditioners, Inc., St. Paul, Minn.



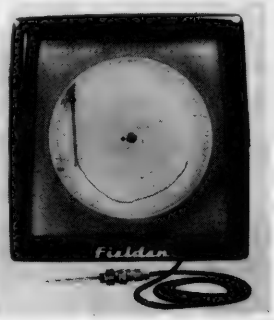
This suspension unit is adaptable for attic, crawl space, utility room or basement installation in the small and medium size house, market, or wherever space saving is of major importance.

The factory assembled unit is extremely compact; it measures 21½ inches high, 24 inches deep, and 65 inches long.

More information? Circle Item 27 on postcard, page 132

Recording Instruments

A line of recorder-controller instruments with a wide range of industrial uses at low cost is offered by Robertshaw-Fulton Controls Co., Philadelphia, Pa. The instruments are used for recording and control of temperature, for recording conductivity, strain, force, position, pressure, and for telemetering. The recorder is composed of four readily interchangeable units. Operating on the null-balance principle using AC signal actuation, these instruments require no batteries or standardizing circuits.



An example of simplification is the bridge components, which are contained in a single unit, permitting easy range changing as well as adaptation of the recorder to a different measurement when necessary. This bridge unit includes as many as four inputs, permitting averaging, addition or differentiation.

A range of nickel, tungsten, and platinum resistance temperature detectors is available, covering temperatures of minus 200 deg C to plus 500 deg C (minus 328 deg F and plus 932 deg F). All except the platinum bulbs feature linearized chart scales. A full range of control forms, both electric and pneumatic, is available.

More information? Circle Item 28 on postcard, page 132

Furnace Integral with Chimney

A fireproof, rust proof, lifetime furnace that utilizes the chimney to save space and money and provide safety and comfort is manufactured by Mortemp Products Corp., Rockville, Md.

Placing the furnace within the masonry walls of the 25 inch sq chimney enhances the safety factor of the furnace, although it is by itself fireproof; results in a saving in space, because as many as three rooms can be heated by openings in the centrally placed chimney base; and reduces the amount of duct work. The saving in terms of money is estimated to be about $432 of floor space per house. The estimated cost of installation is about $550, but if the saving in floor space is subtracted, the actual cost of the furnace is very much reduced.

The furnace is made entirely of 302-18-8 stainless steel, and, according to the company, has a life time use of over 60 years. It is the counterflow type with a heat exchanger about 9 ft tall, and a radiation surface made large by an additional 2500 sq in of radiation surface provided by the exhaust stacks within the chimney heat exchanger. The furnace has in effect a built-in draft; all combustion gases escape vertically up the chimney. It has a gun type burner, Vitroliner exhaust stacks, and M-H controls.

At present the furnace is offered only for oil, but gas models will be available at a later date.

More information? Circle Item 29 on postcard, page 132

Bottom Discharge Cooler

A 4000 cfm bottom discharge cooler is added to the evaporative cooler line of Thermador Electric Mfg. Co., Los Angeles, Calif. Designed for roof mounting where it is desirable to direct air vertically through the roof into a central hall or ducting system, this cooler offers maximum intake of filtered air through all four sides and blows it straight downward, eliminating the need of ducting on the roof.

Thermador now has 10 models ranging from a portable 800 cfm to permanent 5000 cfm installations.

More information? Circle Item 30 on postcard, page 132

Heavy-Duty Thermostat

A heavy-duty thermostat has been developed by Minneapolis-Honeywell Regulator Co., Minneapolis, Minn., for accurate control of temperatures in areas where dust, corrosion and humidity are a problem. The multi-purpose instrument, the company says, is engineered for use in fruit warehouses, banana-curing warehouses, in sweet potato curing sheds, sea-shore buildings, and for a wide variety of farm applications. It controls gas, oil or stoker-fired heating plants.

The thermostat features corrosion-resistant parts and sealed Micro switch contacts. The liquid-filled temperature sensing element is coiled within the cover for protection from damage, ease of cleaning and maximum sensitivity. Control range is between 35 and 100 deg. A switching action permits its use in the regulation of building ventilating systems.

Desired temperatures are set by an external knob with settings indicated on an easily-read dial on the front of the bright red cover. The instrument measures four inches high by six inches wide. It may be mounted on a flat surface or, by using special mounting straps, can be installed on a beam or post.

More information? Circle Item 31 on postcard, page 132

Bronze Valves

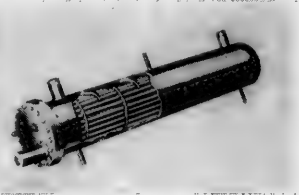
A line of bronze valves equipped with stems of Coradur, a new metallurgical development that overcomes corrosion and dezincification, is announced by American Chain & Cable Co., Reading, Pa. The stem material, an aluminum-silicon bronze alloy, combines a favorable machining index with excellent durability. While 10% lighter than naval brass, it offers high tensile strength (over 95,000 psi), and about twice the hardness. The alloy has a low coefficient of friction, which means longer wearing stem threads and bonnet threads.

The stems are composed of 91% copper, 7% aluminum, and 2% silicon. They are machined from cold drawn, stress relieved rods.

More information? Circle Item 32 on postcard, page 132

2 to 200 Ton Liquid Chillers

By adding internal surface and making it an integral part of the tube, not just mechanically bonded, Kennard Corp., St. Louis, Mo., corrects the low side coefficient of heat transfer in the direct expansion Freon chiller.



The company's chiller is designed for refrigerant in the tubes and water in the shell. Liquid refrigerant is distributed to the tube circuits through one or more distributors, each distributor being fed by a thermal expansion valve.

Positive oil return is assured by incorporating down-feed with ample Freon circuit velocities. This eliminates oil and trapping and insures accelerated oil return from the chiller, even at reduced load.

Ton for ton, according to the company, these chillers are 50% lighter and smaller. This means less space provision, less structural support, and easier installation. Capacities range from 2 to 200 tons.

Bulletin LC-1 sent on request.

More information? Circle Item 33 on postcard, page 132

(*Concluded on page* 130)

The comfort problem in a large department store such as the Emporium above is quite different from, say, a small shop. Crowds change greatly in size; department needs vary. But Honeywell Customized Temperature Control easily meets the comfort problems in a wide variety of Stonestown shops.

Inviting modern exteriors, as this view shows, are an important part of Stonestown's customer appeal. Generous overhang provides shelter from rain and sun. Interiors of all buildings provide the finest of comfort—because Honeywell Customized Temperature Control is on the job everywhere at Stonestown.

Inside the medical center (above) you'll find a Honeywell thermostat in every suite or office. This means patients and guests can enjoy *individual* comfort—truly a customized feature that can't fail to please everyone who works in or visits Stonestown.

How Honeywell
Customized Temperature Control
helps provide

Better business weather for your clients

Why Honeywell Customized Temperature Control is becoming a "must" in all types of buildings

THE state of *Business,* with a capital "B", depends on a multitude of varying factors. But to an important extent, the state of business of a particular client of yours depends on the kind of service he offers—and *how* he offers it.

Take, for example, the Stonestown Shopping Center in San Francisco. All aspects of sound shopping center construction and procedure have been carefully adopted.

Important among these is "indoor weather". Its proper control means a lot to the people who work for your clients—and to those who buy from them, too.

Today the best way to provide proper temperature control is through the use of *Honeywell Customized Temperature Control.*

The key word here is "customized." It means that whatever your clients' control requirements, a Honeywell Customized Temperature Control installation *designed to fit the needs of the building and its occupants is your answer.* This applies not only to heating and cooling, ventilating and humidity control but to industrial control as well.

Only Honeywell can provide true "customized" control. Because only Honeywell manufactures all three types of controls—pneumatic, electric and electronic.

The story, in brief form, of the Honeywell Customized Temperature Control installation in the Stonestown Shopping Center is told here.

The *techniques* used, applied to your particular problems, can help you give your clients the "indoor weather" they've always wanted.

Aerial view of Stonestown, the big regional shopping community in suburban San Francisco. Center includes apartments you see above as well as shopping facilities. Architects: Welton Becket & Associates, Los Angeles. Engineers: Hillberg, Byler and Hengstler, Los Angeles; Deane & Hill, San Francisco.

For comfortable, even temperature in new or existing buildings –of any size–specify Honeywell Customized Temperature Control

Whether it's a shopping center, factory, office, motel, hospital, school–or any size building–new or existing, Honeywell Customized Temperature Control can help meet your clients' heating, ventilating, air conditioning and industrial control problems.

Your clients will not only enjoy more comfort and efficiency, they'll save fuel, too.

For full facts on Honeywell Customized Temperature Control, call your local Honeywell office. Or mail the coupon today.

MINNEAPOLIS **Honeywell**

First in Controls

112 OFFICES ACROSS THE NATION

Henry Stoneson, community builder, president of Stoneson Development Corporation, owners of Stonestown Shopping Center, says:

"We believe Stonestown, a "City Within A City", is one of the most pleasant in the world for the shopper. Important in helping make possible this comfort is our Honeywell Customized Temperature Control installation."

MINNEAPOLIS-HONEYWELL REGULATOR CO.
Dept. HV-4-82, Minneapolis 8, Minnesota
Gentlemen: I'm interested in learning more about Honeywell Customized Temperature Control.

*Name*_____

*Firm Name*_____

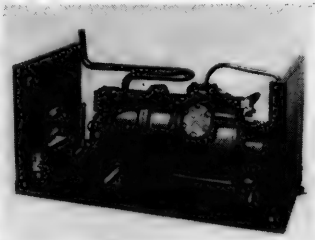
*Address*_____

*City*_____ *Zone*____ *State*_____

(*Concluded from page* 127)

Packaged Condensing Units

Packaged condensing units known as Model SCYC are designed by Worthington Corp., Harrison, N. J., for use in installations where it is desirable or necessary to install a condensing unit remote from the evaporator. The units are very flexible and are suitable for use in many residential and commercial air conditioning applications as well as for industrial cooling requirements. These units are also well suited for small water chiller applications.



Specification sheet C-1100-S88 is available.

More information? Circle Item 34 on postcard, page 132

Two-Circuit Air Conditioner

A 15-ton packaged air conditioner, featuring two separate 7½-ton refrigerant circuits, is added to the 1954 line of the United States Air Conditioning Corp., Minneapolis, Minn.

The equipment includes all of the design and engineering advances incorporated in the company's five smaller packaged units, which provide flexibility of arrangement to meet any installation requirement. In addition, the dual circuit feature provides economy of operation when the full cooling capacity is not required and permits the equipment to meet the usual local code requirements.

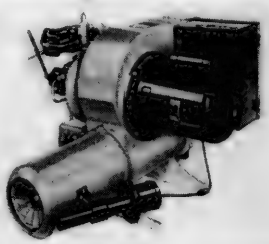
The unit is of sectional construction, comprising compressor, blower, and plenum, each of which can be ordered separately. For year round operation a heating coil can be mounted in the blower or plenum cabinet.

More information? Circle Item 35 on postcard, page 132

Burner Uses No. 4 or 5 Oil

The 4 Hev-E-Oil burner of the Cleaver-Brooks Co., Milwaukee, Wis., is designed for commercial, industrial and institutional buildings containing over 1,500 sq ft of radiation, where more than 6,000 gal of oil, or more than 45 tons of coal per year are burned.

Like other models in the company's line, this model is a low pressure, air-atomizing type burner, but it is the only all electric ignition oil burner designed to burn low-cost No. 4 or 5 oil without preheating.



As easy to install as a domestic oil burner, the company's burner is a complete package, ready to be set into a boiler or heating plant. Completely wired and ready for service lines, automatic controls are connected and pre-tested. One of the features of the new burner is that the control box is mounted on the burner and is readily accessible. Front plates and secondary air or checker work hearth are not needed. All primary and secondary air is furnished by the burner. An oil metering pump accurately measures the correct amount of oil for any given operating condition.

Accessibility of all components assures easy servicing and cleaning. The burner's new fuel flexibility results from the fact that it is easily adjusted for burning regionally varying oils, from No. 1 light oil through No. 5 heavy oil.

This electronically controlled burner cannot be started on high fire. The burner has a built-in, low fire start, in which the small flame gradually builds up to the required size for safe, smooth operation. High-low flame modulation can be secured assuring top combustion efficiency.

More information? Circle Item 36 on postcard, page 132

Designs Special Valves

Entry into the field of special valve design is announced by Mathewson Corp., Inglewood, Calif.

After considerable experience in the field, the firm now branches out to include designs as well as manufacture, having recently acquired rights to newly developed, improved sealing methods.

For the time being the company will concentrate on swing and disc type check valves, vent, line, and other types especially designed for high temperatures, synthetic oils, fuels and chemicals.

More information? Circle Item 37 on postcard, page 132

Steam Trap Vents Fast

A Heat-Kwik Super-Silvertop steam trap, developed by V. D. Anderson Co., Cleveland, Ohio, vents, it is claimed, air out of steam consuming units eight times faster than ordinary inverted bucket traps, and three times faster than air eliminator or blast type traps.

The steam trap is able to accomplish fast air-venting through the use of two separate orifices, one for condensate and a separate bellows orifice for air. When the trap is cold, the bellows orifice is wide open and handles large quantities of air rapidly. After most of the air is removed, the bellows expands and closes the orifice. Thereafter air is removed through the vent hole in the bucket. Since very little air remains in the system the vent hole is said to be of ample capacity.

These new steam traps require a trap factor of never more than 2 to 1. This low trap factor enables the user to purchase a less expensive steam trap than normally required. Due to the construction of the head of the trap, it may be opened for inspection or servicing without removal from the pipeline.

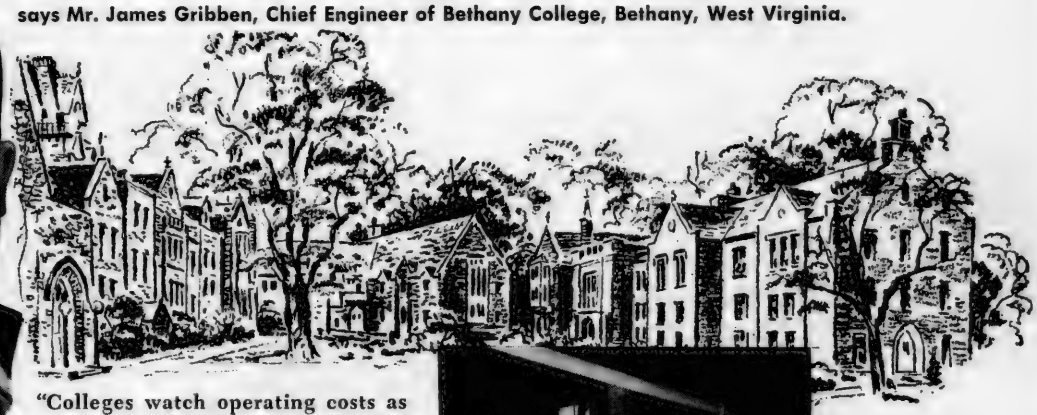
The steam traps have the inverted bucket guided on a hexagonal tube that prevents the bucket from being damaged on the side of the case and keeps the valve and seat in line.

More information? Circle Item 38 on postcard, page 132

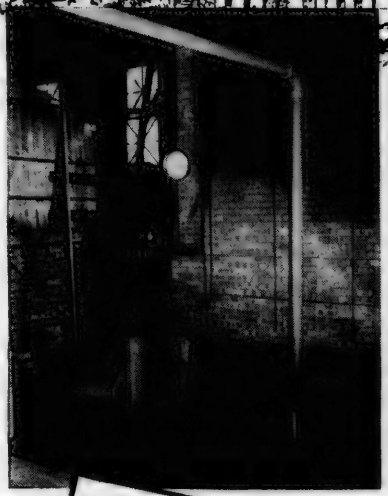
"We 'educated' our College Heating Plant...

with a modern coal installation we saved more than a third of our fuel bill,"

says Mr. James Gribben, Chief Engineer of Bethany College, Bethany, West Virginia.



"Colleges watch operating costs as closely as any business firm—and one big item for our college is the heating bill. That's exactly why Bethany went to the expense of putting in new coal heating equipment! Our old system supplied heat for sixteen buildings—to the tune of 2,600 tons of coal a year. Our new installation, with its automatic stoker, does the same job using only 1,650 tons. That's a fuel saving of 38.9%! Our eyes certainly have been opened to the efficiency and economy of *bituminous* coal—especially when it's burned with modern equipment."



Here's Bethany's new boiler room, showing the pipe of the automatic stoker. **THIS MODERN EQUIPMENT WILL PAY FOR ITSELF, THROUGH FUEL SAVINGS ALONE, IN LESS THAN TWO YEARS!**

Modern combustion installations can add anywhere from 10% to 40% to the energy obtained from the same amount of coal in years gone by. Great advances have been made in coal- and ash-handling equipment, too—cutting labor costs—making coal as clean and convenient to use as any fuel.

If you're planning to modernize your present installation—or thinking of building a new plant, call in a competent consulting engineer. He'll show you how a modern coal system designed to meet your specific needs can save you money and serve you better!

And don't forget—you'll always be able to get the coal you need. America's coal industry is the most efficient in the world. America's coal reserves are ample for centuries to come. Right now and for the future, too, coal users can be assured of a dependable fuel supply at reasonable prices.

BITUMINOUS COAL INSTITUTE
A Department of National Coal Association
Washington, D. C.

If you're running your own steam plant—for heat or for power—you just can't afford to ignore these facts!

COAL in most places is today's most economical fuel.

COAL resources in America are adequate for all needs—for hundreds of years to come.

COAL production in the U.S.A. is highly mechanized and by far the most efficient in the world.

COAL prices will therefore remain the most stable of all fuels.

COAL is the safest fuel to store and use.

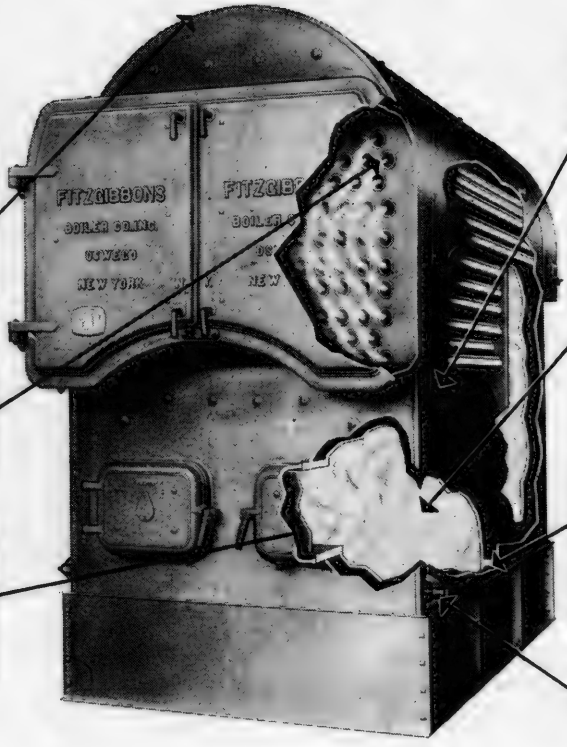
COAL is the fuel that industry counts on more and more—for with modern combustion and handling equipment, the inherent advantages of well-prepared coal net even bigger savings.

FOR HIGH EFFICIENCY 🔥 *FOR LOW COST*

YOU CAN COUNT ON COAL!

WHY THE FITZGIBBONS "D" TYPE

More Than Meets Your Boiler Specifications



Steel Construction — heavy "flange" quality steel plate is electrically welded to provide strength and durability. Workability of steel permits boiler design for quick, economical transfer of heat.

Easy Cleaning For All Surfaces — tubes are reached through large doors at front of boiler. Firedoors give ample access to firebox heating surfaces.

Rugged Door Frame — water-cooled fire door frame of extra-heavy steel is welded between shell and firebox water wall. An asbestos gasket-sealed, soot-tight fire door completes the assembly.

Rapid Water Circulation — concentration of heat at high point of crown sheet and unimpeded waterways induces faster circulation, brings more water in contact with more heating surface in a given time.

Complete Combustion — firebox of adequate height and volume provides maximum efficient burning of fuel. Ideal for oil, gas, or coal (stoker or hand-fired).

Welded Mud-Ring Design — a heavy steel bar is welded between sidewalls of shell and firebox to give added strength to water-leg section and longer life to the boiler.

Waterside Inspection — hand holes, 3" x 4½" large, permit complete inspection and cleaning of crown sheet and water-leg. From 6 to 14 hand holes depending on size of boiler.

MOST ECONOMICAL IN FUEL — 1886 — THE FITZGIBBONS BOILER

SINCE 1886

SBI

These features, plus construction that meets or exceeds ASME Code requirements as certified by a resident Hartford Inspector, are your assurance of lasting, fine performance and lowest operating costs. Sixteen sizes from 876,000 Btu to 10,200,000 Btu. For complete details, write to the Fitzgibbons Boiler Company, Inc., 101 Park Avenue, New York 17, N. Y. Ask for Catalog HV-4.

The Fitzgibbons Boiler®

PRODUCT INFORMATION SERVICE

Use the postage-free postcard below for further information on:

- **News of Equipment and Materials**

or a copy of the following

- **New Catalogs**

Circle the item Numbers in which you are interested and print clearly your name and address with title.

NEW CATALOGS

UNIT TYPE DUST COLLECTOR—A four-page, two-color bulletin, No. 916, describing its unit-type CN cloth bag, dust collector, is announced by Pangborn Corp., Hagerstown, Md. This bulletin tells how dust control for all types of finely divided dry dusts can be provided for smaller volume applications at low equipment and installation costs. It points out how the collector is designed for indoor use, permitting clean air to be discharged inside the plant; a practice which results in a distinct saving where air is heated or cooled. Detailed descriptions of the dust collector operation and the cloth bag sealing mechanisms are presented. Also included are the assembly features of each dust collector.....Item 101

PLASTIC PUMP FOR CORROSIVES—A bulletin illustrating its line of flex-I-liner plastic pumps is issued by Vanton Pump & Equipment Corp., New York, N. Y. These pumps, having neither stuffing box, shaft seals, gaskets nor internal valves, are designed to handle corrosive fluids and abrasive slurries. Bulletin contains cut-away illustrations, diagrams, applications, operating specifications and performance data.....Item 102

FLEXIBLE COUPLINGS—A 20-page catalog of flexible couplings is published by Lovejoy Flexible Coupling Co., Chicago, Ill. All items are detailed with drawings, charts and photographs. A pulsating load conversion table and a horsepower-to-torque table are presented.....Item 103

STAINLESS STEEL TUBES—Bulletin S-222, covering its line of stainless steel tubes, is published by Globe Steel Tubes Co., Milwaukee, Wis. It describes the extent of the company's operations, advantages that derive from use of stainless steel tubing, and the analyses of the steel that give it its non-corrosive quality. In addition, technical and fabricating data on finishes, lengths, and workability are given.....Item 104

COOLING TOWERS—A bulletin detailing specifications, features and capacities of its line of cooling towers, is issued by Havens Structural Steel Co., Kansas City, Mo. Improvement changes emphasized are the all-weather aluminum paint protection, and the fan and drive assembly with sleeve type, porous bronze bearing with brass slinger and thrust. Other features discussed are improved water and air distribution and changes in distribution pans and collecting basis.....Item 105

STUD DRIVER—A new four-page bulletin No. 1401-2 issued by Velocity-Power Tool Co., Pittsburgh, Pa., pictures and describes details of the design, operation and numerous applications for the company's Model P driver, a new model of a portable powder-actuated tool for driving steel studs into steel, concrete or masonry, and for other work. The bulletin announces that the driver is listed and approved by Underwriters' Laboratories, Inc. It describes the tool as safe, fast and economical in fastening steel to steel, steel or wood to concrete, and facing materials to a variety of supports, thus eliminating the slow, tedious work of drilling, plugging and anchoring of studs. Blank cartridges are used to drive steel studs neatly, in a single and simple operation. Accidental discharge is impossible, as dropping the tool automatically releases a safety arm.....Item 106

HEAT EXCHANGER TUBING—Folder TB329A on heat exchangers and condensers, is issued by The Babcock & Wilcox Co., Beaver Falls, Pa. The folder lists the analyses and mechanical properties of 29 carbon, alloy, and stainless tubing steels used in various types of heat exchangers and condensers. Additional data presented in other tables include reference specifications and applications information.....Item 107

4½ INCH WARM AIR SYSTEM—A brochure bringing out features of its Gale-Aire 4½ inch system is published by Char-Gale Mfg. Co., Amelia, Ohio. Emphasis is placed upon price and mass appeal, both of which are accomplished, it is said, by packaging all fittings, thus eliminating handling and warehouse costs; by use of snap-ons for stock fittings; and by cutting straight piping in 10 ft. tubes, with a saving in handling and material costs. A table of equivalent lengths in the 4½ inch system, a chart of capacities of 4½ inch round duct systems, and price lists of fittings, registers and vents, are given. Other sections are concerned with diffusers, registers, and the company's connector tool.....Item 108

TWO-STEP TIME DELAY RELAY—A two-step, pneumatically-controlled time delay relay is described in Bulletin SR4, available from Elastic Stop Nut Corp. of America, Elizabeth, N. J. The 4-page illustrated bulletin describes the Model NET Agastat time delay relay, designed to introduce either a sequence of time delay periods, or a momentary impulse, into an electrical circuit.....Item 109

REMOTE LIQUID LEVEL INDICATORS—A 20-page catalog on remote liquid level indicators is issued by Yarnall-Waring Co., Philadelphia, Pa. Bulletin WG-1824 contains a complete description of the company's remote liquid level indicator. In addition, valuable application, installation, recommendations and wiring diagrams are presented.....Item 110

RUST PREVENTION—The 1954 general catalog, Form No. 253, of Rust-Oleum Corp., Evanston, Ill., is dedicated to showing all industry how to stop rust. It features 94 color chips of the company's products and includes complete instructions for surface preparation and application of primers, short oil and long oil type coatings, machinery and implement finishes, chemical and heat resistant type coatings, sealers, oil field finishes, thinning oils, and floor and masonry coatings. Application photos are used throughout the book to show exactly how each type of Rust-Oleum product is used. In addition, two pages of the new catalog are devoted to questions and answers.....Item 111

Postage Will be paid by Addressee

No Postage Stamp Necessary If Mailed in the U. S.

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 53, SEC. 34.9, P. L. & R., NEW YORK, N. Y.

HEATING AND VENTILATING

148 LAFAYETTE STREET

NEW YORK 13, N. Y.

READERS' SERVICE DEPT.

SOLENOID VALVE APPLICATIONS—A 4-page bulletin, 50A, on solenoid valves and their applications, is available from the J. D. Gould Co., Indianapolis, Ind. The bulletin illustrates and describes the complete line of solenoid valves made by the company for automatic or remote cnotrol of steam, air, gas, or liquid flow. Described in the new bulletin are 25 types of solenoid valves, with details on their applications, operation, specifications, design, construction, and prices. The various models range in size from ¼ to 3 inches, and handle pressures up to 1200 psi.....Item 112

INDUSTRIAL PROCESS DRYING—A brochure of engineering case studies, released by Dravo Corp., Pittsburgh, Pa., describes a variety of successful applications of conventional warm air space heaters to the job of industrial process drying. Featuring installations for curing rubber, and drying ceramic, paper, lumber and woven products, the studies explain the methods followed in applying heaters to different types of drying systems.....Item 113

COOLING TOWER MAINTENANCE—As the result of a report that rapid and serious deterioration was occurring in redwood cooling towers in the Gulf Coast area, the Cooling Tower Institute, Palo Alto, Calif., California Redwood Association, and interested tower users collaborated in a study of the problem. Facilities of the U. S. Forest Products Laboratory and the Institute of Paper Chemistry were placed at their disposal. The report of their findings is now made available by the Institute in a 13-page report which discusses the types of redwood deterioration—chemical and biological; operating conditions which affect deterioration—age of tower, temperature of inlet water, pH of circulating water; and methods of controlling deterioration.....Item 114

LIQUID HEAT IN PROCESSING—An 8-page leaflet, New Developments in Liquid Heating of Plastics-Processing Machinery, discussing the principles underlying the successful application of liquid heat transfer media to the heating and cooling of plastics, calenders, extruders, injection molders, and presses, and showing the advantages of liquid heating is issued by American Hydrotherm Corp., Long Island City, N. Y.....Item 115

HEAT RECOVERY EQUIPMENT—How to save boiler plant fuel and labor costs by means of continuous boiler blowoff heat recovery equipment is one of the subjects featured in bulletin WC-114, issued by Graver Water Conditioning Co., New York, N. Y. Two full pages of charts, curves, and typical calculations enable engineers and boiler plant operators to compute rapidly the savings from proper blowoff heat recovery in any given boiler plant. Using a simple four-step procedure, the savings figure is arrived at with only a minimum of information required. Detailed flow diagrams as well as explanation of the company's continuous boiler blowoff heat recovery systems are given, as well as the accepted American Boiler and Affiliated Industries standards for total dissolved solids and suggested silica concentrations in the boiler system.....Item 116

ACTIVATED CARBON—A chart to help in the selection of the right type of activated carbon is developed by Barnebey-Cheney Co., Columbus, Ohio. The Adsorbite type selection chart lists a number of contrasting applications and suggests specific grades of activated carbon most likely to be found suitable for specific adsorption problems.....Item 117

STEAM GENERATING EQUIPMENT—Bulletin SB-50, a 16-page condensed catalog describing and illustrating its line of steam generating equipment, is published by Erie City Iron Works, Erie, Pa. Generous use of sectional views with concise descriptions make this a handy reference for consulting and power engineers. Sections are devoted to steam generators, custom and standard made; waste heat boilers; the Travagrate continuous ash discharge spreader stoker; the company's underfeed stokers and Unitype coal pulverizers for steam generation; fusion welded H.R.T. boilers; and allied equipment.....Item 118

AIR CONDITIONING SPECIALTIES—A condensed air conditioning-refrigeration catalog, Form W-2-S, is published by A-P Controls Corp., Milwaukee, Wis. It furnishes information about the company's line of dependable valves, filters and driers for air conditioning and refrigeration. Complete product specifications, charts, how-to-select information and sales data are provided. New products, improved designs and product model number changes are listed.....Item 119

SWITCHES, INDICATING LIGHTS—The full line of its oil-tight, push-buttons, indicating lights, selector switches, and accessories is described in a 4-color, 16-page publication available from General Electric Co., Schenectady, N. Y. Designated as GEA-5779B, the booklet explains how this equipment operates and its application. Included are cross-section drawings, full-color application photos, dimension and outline diagrams, and complete ordering information.....Item 120

VIBRATION ISOLATOR—Bulletin 327 issued by The Barry Corp., Watertown, Mass., gives technical and application information on the Series 262 and 633 Barrymount isolators. Included are data on dimensions and load ratings, installation procedure, variation of natural frequency with load, and efficiency of isolation. These mounts are designed to isolate vibration and noise caused by or motor-driven equipment applying static loads of 30 to 260 lb. to each isolator.....Item 121

DRAINAGE FITTINGS — A folder that illustrates and describes K hub-top drainage fittings is issued by The Kuhns Brothers Co., Dayton, Ohio. The items included are male and female tucker connectors, hub-top single and double TY's, and Util-TY's with solid or removable hubs. The Util-TY fittings with two inlets permit extra fixtures to be connected without additional vent stacks.....Item 122

PIPING HANDBOOK, FITTINGS — The 304-page fittings catalog and piping handbook announced by Ladish Co., Cudahy, Wis., gives detailed dimensional data and specifications on the complete line of controlled quality seamless welding pipe fittings, forged ASA flanges, large diameter and Tema flanges as well as screwed and socket welding fittings. The catalog includes a 56 page technical data section featuring new, easy to use, allowable stress and P/S tables, maximum allowable working pressure charts as well as many other tables giving the latest provisions of applicable piping codes and standards to assist in solving piping problems.....Item 123

TEMPERATURE CONTROLS—A catalog describing 395 different heating and cooling control devices, of which 137 have never been listed before, makes it the largest in the history of Minneapolis-Honeywell Regulator Co., Minneapolis, Minn. Chief addition to the Honeywell line for 1954 is its new T-86 Round thermostat, a plastic-covered instrument that is the company's standard thermostat for use in hand-fired, stoker, oil, electric and both 24-volt and millivoltage (self-powered) gas heating systems. Other controls and systems described in detail include the company's electronic Modufow system, which uses an outdoor thermostat to control indoor temperatures according to outside weather conditions. The air-conditioning control section also is expanded in the 1954 catalog, according to the company. In addition to product descriptions the booklet gives technical information on all Honeywell heating and cooling control systems, valve capacities and thermostat heater setting data.....Item 124

BRONZE PUMP — A two-color catalog sheet issued by Hypro Engineering, Inc., Minneapolis, Minn., describes the Hypro Model 4300 bronze pump designed for continuous water circulation. The illustrated literature points out the features of the pump, such as the pressed fit of the stainless steel shaft into the inner ball bearing race to restrict lateral movement of the scoop rotor, thus minimizing end thrust wear within the pump. A breakdown performance test with water was conducted for 5,000 hours at 40 lb. pressure, without measurable wear in the Hy-Car rubber rollers or the pump.....Item 125

Circle numbers on which you wish further information.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	101	102
103	104	105	106	107	108	109	110	111	112
113	114	115	116	117	118	119	120	121	122
123	124	125	126	127	128	129	130	131	132
133	134	135	136	137	138	139	140	141	142
143	144	145	146	147	148	149	150	151	152
153	154	155	156	157	158	159	160	161	

This service available only to U. S. and Canadian readers.

PLEASE PRINT Apr. H-54

Name .....

Title .....

Firm .....

Nature of Firm's Business .....

Street .....

City .....

Zone ..... State .....

This card is void after July 1, 1954

TRAINING FOR WELDERS—A pictorial booklet describes the curriculum and organization of the Hobart Trade School, Troy, Ohio. Courses offered include arc welding, carbon arc welding, alloy steels and cast iron, inert-gas-shielded-arc welding, hard facing, tool welding, stud welding, submerged arc welding, oxy-acetylene welding and cutting.....Item 126

ADJUSTABLE V-BELT—An 8-page catalog on the Veelos TD and TE adjustable V-belt for D and E belted drives is published by Manheim Mfg. & Belting Co., Manheim, Pa. Studs, cup-washers and T-screws of the V-belt are illustrated in detail. Other pages explain installation and operation characteristics.....Item 127

CENTRIFUGAL PUMPS—Bulletin MA-51, describing its line of MA centrifugal pumps, for air conditioning and refrigeration, is issued by Marlow Pumps, Ridgewood, N. J.....Item 128

AUTOMATIC HEAT CONTROLS—Bulletin No. 281-ME issued by the Mercoid Corp., Chicago, Ill., is a condensed catalog of the company's residential and commercial automatic heating controls, including thermostats, limit controls, water level controls and others.....Item 129

REFRIGERATION PRODUCTS—A 32-page, two-color catalog covering its complete line of unit coolers, valves, automatic defrost systems, coils, ice cube makers, and coil and pan combinations, is offered by Tenney Engineering, Inc., Newark, N. J. Illustrating these products are 50 photos, 15 schematic drawings and 14 engineering drawings. The bulletin contains 31 tables giving dimensions, performance data and complete engineering specifications for each products. It also gives special uses, features and advantages of each product. In addition, the catalog includes four pages of practical engineering data and reference material. Fifteen charts are included in this section. They list information on heat leak factors, service factors, heat of occupancy, areas and volumes of walk-in coolers, load factors for glass areas of refrigerators, product storage data, capacities of liquid and suction lines for Freon and methylchloride, relative humidity and temperature-pressure conditions. Five selection tables simplify specification of coils and pans for walk-in coolers, display cases, dairy wall cases and reach-in refrigerators.....Item 130

WATER CONDITIONING — A bulletin called American Reactors is issued by American Water Softener Co., Philadelphia, Pa. It describes the company's three-stage reactors for softening or clarifying surface waters for process, industrial or municipal applications and for the treatment of industrial waste water for re-use or for the reduction of stream pollution. They are recommended for all precipitation and absorption processes involving cold water. Other uses are for lime or lime-soda softening of hard water for municipal, industrial and process applications, de-alkalinization and coagulation of surface water as a pre-treatment to ion exchange or hot process softeners, or for removal of silica from the water by adsorption with ferric hydroxide or other hydroxides in the sludge.....Item 131

INDUSTRIAL DRAFT CONTROL—A 16-page booklet offering comprehensive coverage of draft controls, is published by [illegible] Mfg. & Sales Corp., St. Joseph, Mo. Featured in the handbook, entitled A Handbook of Draft Control for Industrial Installations, is the BB draft regulator, designed specifically for commercial and industrial applications on boiler plants from 16 to 48 inch smoke outlets. Sections of the handbook discuss the availability of stock size controls, details to consider in selecting the proper size regulator for each job, and details of installation on various types of breechings. It concludes with illustrations of combustion tests and instructions for making the correct draft adjustments on the company's draft regulator.....Item 132

BOILER WITH TWO PASS SYSTEM—Bulletin BE3 describes the two pass system with forced draft of the Continental automatic oil or gas fired boiler of Boiler Engineering & Supply Co., Inc., Phoenixville, Pa. According to the bulletin, air enters through turbine-like vanes which create a spinning or turbulent flame in the furnace. The spinning gas technique is described as giving greater heat transfer per pass. A section is devoted to construction detail of these 20-500 hp boilers, and the advantage of hinged doors on front and back is emphasized. Other features taken up are the forced draft, dual airflow burner, simplified, accessible construction and maintenance.....Item 133

FAN DATA BOOK—Ventilation engineering information is included in Bulletin A-108, Fan Engineering Data, issued by Hartzell Propeller Fan Co., Piqua O. Included are fans laws and formulae, terms and definitions, recommended velocities for exhaust hoods, an air pressure conversion table, and charts covering duct resistance, entrance losses and rectangular equivalents of round ducts. Other sections discuss fan installation, maintenance and lubrication, explain noise problems, and show the characteristics of various propeller and wheel designs.....Item 134

CELLULAR GLASS INSULATION—A 16-page catalog, Foamglas—the Long-life, Stay-dry Insulation, for industrial, commercial, and public buildings, is issued by Pittsburgh Corning Corp., Pittsburgh, Pa. It lists condensed specifications for the application of the insulation in walls, ceilings, floors, roofs, perimeters and in low temperature space insulation. Physical properties, characteristics, and performance data of the cellular glass insulations are fully covered.....Item 135

LIGHTWEIGHT PIPE—As a practical help to pipe users, Naylor Pipe Co., Chicago, Ill., issues bulletin No. 507, showing typical applications of its lightweight rockseam spiralweld pipe and fittings. Included are standard specifications for pipe from 4 to 30 inches in diameter, together with data on fabricated fittings, flanges, and connections.....Item 136

PIPE MACHINES, POWER DRIVES—A 16-page catalog of power-driven pipe machines, power drives, and their accessories, is published by Beaver Pipe Tools, Inc., Warren, Ohio. The catalog covers selling features, dimensions, operating capacities, ordering specifications, dies available and accessories for five pipe machines and power drives, plus the new 55 universal nipple chuck. Models A, B, E pipe and bolt machines and Models D and C-1 portable power drives, are fully described and shown in color. Pen and ink sketches show various adaptations and features of the equipment.....Item 137

SMOKE ALARM—Bulletin 110 describing the merits of its Model M smoke alarm for coal, oil, and gas burning installations, is distributed by Standard Instrument Corp., New York, N. Y. The bulletin points out that the presence of illegal smoke means waste, but that with the company's smoke alarm smoke violations and complaints are eliminated because the operator is immediately alerted. Low cost is emphasized, as well as the fact that the item is shipped as a unit.....Item 138

SHEET METAL FASTENERS—A combination catalog and engineer's manual for its line of Paneloc aircraft fasteners is distributed by Scovill Mfg. Co., Waterbury, Conn. This 58-page booklet, in addition to giving general information, presents detailed engineering data and performance, installations and special applications. The fastener is designed, primarily for the aircraft industry, as a fastener to hold together two overlapping metal sheets under conditions of tension, shear and vibration. It is also suited for use in similar applications in any place where panels, inspection plates and ductwork must be held secure and still be reading removed.....Item 139

FANS AND BLOWERS—Bulletin SDA-160, describing its line of fans, blowers, penthouses, and automatic louvers, is published by The Peerless Electric Co., Warren, Ohio. Illustrated with photographs, drawings, charts, and price lists, the bulletin emphasizes the salient features of the company's products. The section devoted to fans lists features of Type PVS fans for kitchens, laundries, and factories; the PAT and HAT Ventilattic fans, which are vertical and horizontal type attic fans for houses and clubs; and Type PVB industrial exhaust fans. Sections are given to belt and direct drive utility blowers and pressure blowers, as well as penthouses, automatic louvers, and blower-filter package units.....Item 140

AIR CONDITIONING PRODUCTS — The air conditioning equipment of Drayer-Hanson, Inc., Los Angeles, Calif., is displayed in a bulletin designated Cat-301. Evaporative condensers, direct expansion water chillers, cooling towers, and surface coils for steam and water, are among the air conditioning equipment described and illustrated by photographs. A page is also devoted to ceiling and floor type commercial refrigeration units.....Item 141

LAGGING ADHESIVES — A four-page, three-color bulletin describing Adhez-A-Kote lagging adhesives and coatings for shrinking, sizing, bonding and protecting insulation lagging fabrics is available from General Paint Corp., San Francisco, Calif. Designated as Technical Bulletin 5307 (A.I.A. File No. 37-D), the publication outlines features of the product, pictures typical installations, and provides an actual sample of treated lagging fabric. Complete data on proper application of the adhesive is included.....Item 142

FOUR-LIPPED RUBBER SEAL — Literature describing the Quad Ring, a four-lipped rubber seal that resists spiral twist, is issued by Minnesota Rubber and Gasket Co., Minneapolis, Minn. The literature details applications, engineering features and characteristics of the Quad Ring, shows cross-section drawings of the ring under various pressures and compares it in chart form with rubber O rings. Also shown are cross-sections of a typical installation and complete listings of all available sizes, dash numbers and tolerance variables.....Item 143

ROLL-FORMED METAL TUBING—A 20-page catalog, as a guide to the selection of roll formed metal tubing, is offered by Acme Tube, Inc., Irvington, N. J. The first section of the catalog describes and illustrates the roll forming method. The remainder of the publication is utilized to classify and illustrate each of the basic types of tubes, channels and angles that can be produced.....Item 144

HEAT PUMP—A bulletin describing its Brunner Comfortaire year-round home heat pump air conditioner is issued by American Coils, Newark, N. J. It contains photographs, illustrations and tables of operating data.....Item 145

ANTHRACITE HEAT FOR LARGE BUILDINGS—Anthracite Anthracite Heating for Commercial and Public Buildings, a 36-page illustrated booklet, is available from Anthracite Information Bureau, New York, N. Y. The booklet was prepared for architects, consulting engineers and building operators, and discusses the nine factors which affect the selection of fuel and heating equipment: maintenance cost, operating labor cost, freedom from smoke, dependability of supply, reserve storage on the premises, adequate fuel reserves, comparative fuel cost, and the variety of equipment available. Chapters are devoted to the use of anthracite in schools and apartment houses.....Item 146

DRAINAGE INSTALLATION MOVIE—A 15-min. sound, color film, Down the Drain, which is of interest to wholesalers and plumbing contractors, architects and trade schools, is issued by Chase Brass & Copper Co., Waterbury, Conn. The film shows the actual installation of copper tube soil, waste and vent lines for the kitchen, bathroom, and laundry of a house. Action in the picture demonstrates pre-cutting and pre-assembling operations that can be performed at the site. It also illustrates the economies that can be made in the weight of materials in time and physical effort in installing a copper tube drainage system. Film further shows pre-assembled units being fitted into place, and joints being soldered.....Item 147

COPPER PLUMBING FITTINGS — To mark the beginning of its fiftieth year of business, Northern Indiana Brass Co., Elkhart, Ind., has announced publication of Nibco Catalog H on fittings for copper plumbing. This 80-page catalog gives design details and up-to-date list prices for all of the fittings which the company manufactures. It also serves as a handy manual of engineering data important in the installation of copper tube supply and drainage systems. .....Item 148

GREENHOUSE TEMPERATURE CONTROL—A study of the latest applications of automatic temperature control systems in greenhouses is published by Johnson Service Co., Milwaukee, Wis. Booklet M-14 describes how the company's engineers have designed a system whereby greenhouse temperatures are regulated in accordance with the outdoor light intensity. This system varies the temperature to compensate for the intensity of the sunlight and thereby maintains optimum growing conditions at all times. Other developments brought out by the study include the automatic operation of roof ventilators and the use of roof ventilators for both temperature and humidity control. It reveals how greenhouse temperatures may be changed from day to night levels automatically at the correct time each day by means of an astronomical clock inserted into the temperature control system.....Item 149

THERMOSTATIC BIMETALS—A 36-page illustrated booklet, describing and explaining 22 uses of bimetal as actuating elements in temperature responsive devices is published by W. M. Chace Co., Detroit, Mich. Ten pages of engineering data for element design and selection are included.....Item 150

OIL SEPARATORS—Bulletin R-314, devoted to its oil separators, is issued by Eclipse Fuel Engineering Co., Rockford, Ill. A section of the bulletin describes how perforated metal strainers and filters are used for separating particles and how filter and strainer baskets are available in a wide range of sizes. Although standard construction is cast iron, simplex and duplex separators can be made to special order from a number of metals, all of which are listed. A page of dimensions and specifications is added.....Item 151

ANTI-FREEZE DATA—A 32-page technical bulletin describing ethylene oxide, ethylene glycol and diethylene glycol is published by Allied Chemical & Dye Corp., New York, N. Y. The bulletin gives the uses, chemical and physical properties, handling and storage features and safety precautions for each chemical. The behavior of each of the materials with other chemicals is described by complete reaction formulas. Ethylene glycol is an anti-freeze and can be used in radiant heat and snow melting systems.....Item 152

EXTREME PRESSURE LUBRICANT—Bulletin 101, covering Molykote, Type BR-2, a multi-purpose, extreme pressure lubricant, is available from The Alpha Corp., Greenwich, Conn. The bulletin points out that the lubricant is suitable for use in highly-loaded ball and roller bearings and on heavily-loaded sliding friction surfaces for temperatures from —30 to 350 deg. The two-color bulletin carries the specifications covering the lubricant and lists the prices and ordering information.....Item 153

PANEL HEAT, COOLING CEILINGS—The radiant panel heating, radiant panel cooling, and acoustic control ceiling of Burgess-Manning Co., Chicago, Ill., is described in a brochure published by the company. The 3-way functional suspended ceiling is described to be easy to lay out, easy to install and tells why and how. Illustrations, diagrams and charts complement this presentation, which also includes applications; performance characteristics; design procedure; layout procedure; how to estimate; and installation short cuts which result in important savings in material, labor, floor to floor space, and weight.....Item 154

BOILER-BURNER UNIT—A 16-page color catalog giving a full description of the line of Kewanee-Ray boiler-burner units is published by Kewanee-Ross Corp., Kewanee, Ill. The catalog aids in the selection of the proper unit for any particular application to high or low pressure heating, power or process steam. Illustrated with photographs, space is devoted to outstanding features of the company's oil burner, such as the air register ring assembly, the burner's ability to operate with heavy oil, and the simplicity of its construction. A section describes in detail the combination gas and oil burner which changes fuels at the flick of a switch, while another page is devoted to constant velocity control of the air with the forced draft fan which delivers air to the windbox at constant pressure.....Item 155

DUST COLLECTORS—The problem of dust collection in the food and processing industries and Aerodyne dust collectors are discussed in Bulletin 171 published by The Green Fuel Economizer Co., Inc., Beacon, N. Y. Titled Industrial Dust Collection, the bulletin is designed to help engineers evaluate the desirability of installing dust collectors by telling of their advantages. .....Item 156

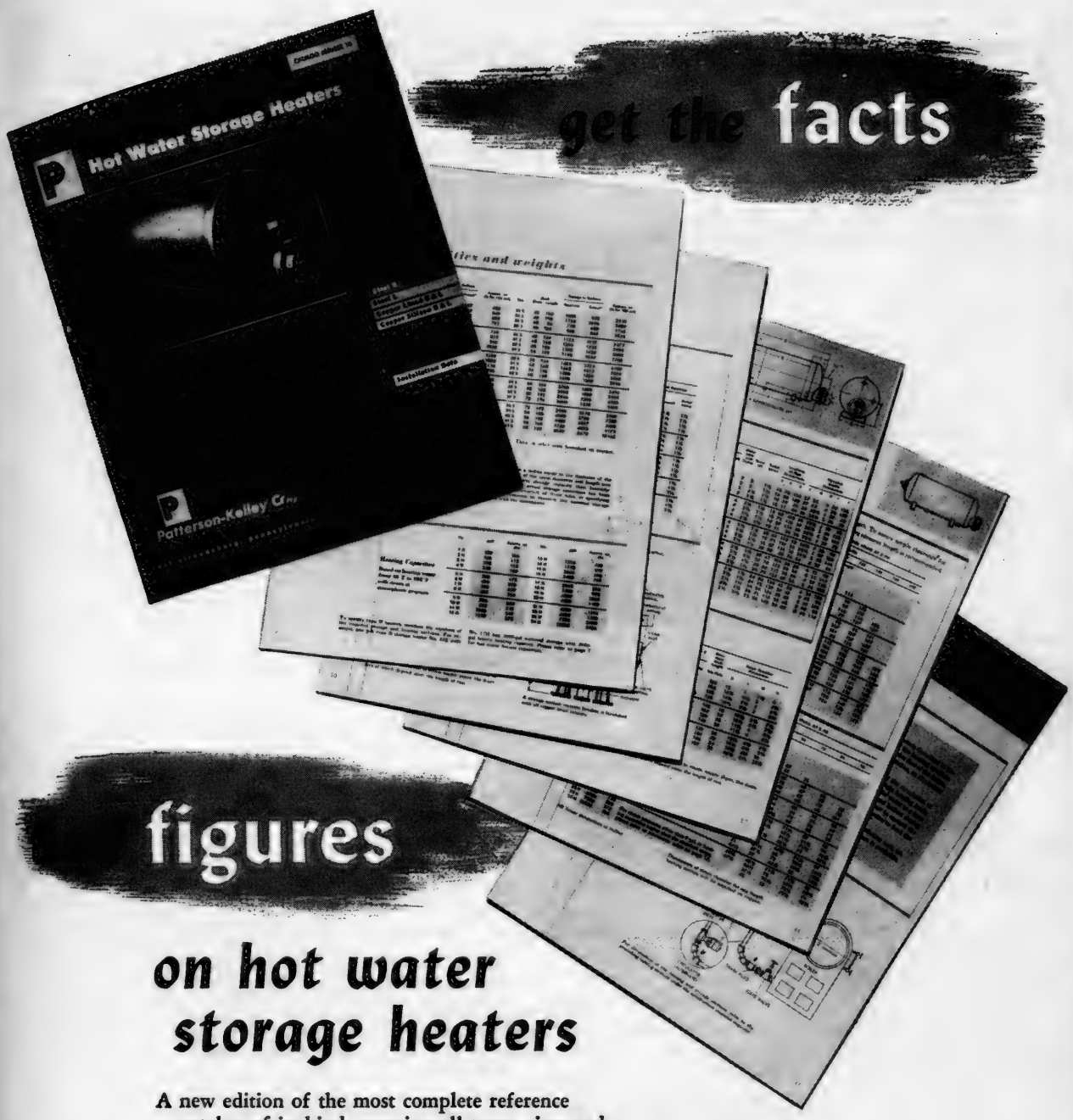
PLUMBING AND HEATING SPECIALTIES—The plumbing and heating specialties of Paul Munk & Co., Inc., Long Island City, N. Y., are described in a 50-page catalog for distribution to jobbers. Each item offered is illustrated by photograph or drawing. The complete line is divided into specific categories, such as heating specialties, tank trimmings and tubular goods. .....Item 157

PACKAGED AUTOMATIC BOILER—A four-page folder describes the Powermaster packaged automatic boilers of Orr & Sembower, Inc., Reading, Pa., as applied to schools. The front cover of the bulletin describes the advantages of packaged automatic boilers contrasted with equipment of conventional design. Two dual installations of 15 p.s.i. boilers in typical schools are illustrated on the front cover and a 200 h.p. gas-fired packaged unit at Southwestern Louisiana Institute, Lafayette, La., is shown on the back cover. Outstanding constructional and operational advantages of the company's boiler, 3-pass design, forced draft, automatic controls, are described and pictured. The firing equipment for light and heavy oils as well as gas is described in the company's Veriflow air-atomizing oil burner and pre-mix gas burner designs. A list of typical installations in schools classified by sizes appears on the back cover.....Item 158

REFRIGERATION EQUIPMENT—Bulletin WP-1099-B61 on industrial equipment is offered by Worthington Corp., Harrison, N. J. It contains information about special features, types, sizes and capacities of the company's various product lines of condensers, coolers, compressors, refrigeration units for Freon, steam power plant equipment, centrifugal and rotary pumps, and describes the application of each of these lines.....Item 159

NEW HEATING SYSTEM—A catalog covering its SelecTemp heating system is made available by Iron Fireman Mfg. Co., Cleveland, Ohio. It points out that the system gives individual thermostatic control in each room at a cost which permits its use even in the smallest home. The key to economy, according to the bulletin, is that each separate heater is individually controlled. The fully illustrated catalog lists eight important advantages of the system and demonstrates with charts and photographs how simply and quickly it can be installed.....Item 160

DAMPERS, FLUES, DUCTS—A brochure is offered by Delaware Steel Fabricating Corp., Wilmington, Del., showing facilities and representative products, among which are all types of structural steel and plate work, expansion joints and panels, dampers, flues, and ducts.....Item 161



get the facts

figures

on hot water storage heaters

A new edition of the most complete reference catalog of its kind, covering all types, sizes and styles of p-k hot water storage heater equipment. A reference work needed by every architect, engineer, contractor or user of hot water for process or service. Because of its size, cost, and importance, will you please request your Free copy on your company letterhead.

the **Patterson-Kelley Co.,** inc.

940 Burson Street, East Stroudsburg, Penn.

© 1952

101 Park Avenue, New York 17 • Railway Exchange Building, Chicago 4 • 1700 Walnut Street, Philadelphia 3 • 94-A Huntington Avenue, Boston 16 • and other principal cities.

PRODUCT APPLICATIONS

New, Unusual, or Ingenious Uses of Equipment and Materials

Conducted by WM. B. FOXHALL, Associate Editor

Packaged Plant Cools and Heats Office Building

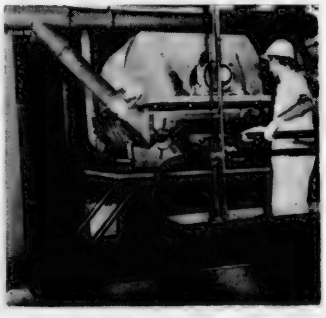
PROBLEM: For a new two-story rental office structure in Freeport, N. Y., air conditioning was to be provided from a central plant.

SOLUTION: A factory-assembled air conditioning system uses an RKW-20 unit manufactured by U. S. Air Conditioning Corp., to serve the first floor, and an RKW-25 for the second floor. The equipment contains the elements of a central station system in a single casing including a water cooled condenser supplied by well water. Steam coils in the equipment are supplied by a gas-fired boiler for heating. All equipment is located in the building basement.

RESULTS: Design and installation of a central system was simplified by use of factory assembled equipment.

Unloading of Dryers Made Dust-Free

PROBLEM: Lederle Laboratories Division of American Cyanamid Co, Pearl River, N. Y., found that unloading product dryers during manufacture of pharmaceutical products is one of the operations most likely to produce dust and create personnel and housekeeping problems. There may also be a considerable loss of valuable product. In drying rooms which handle Aureomycin and vitamin by-products, three rotary vacuum dryers are used, each with a capacity of 2,000 lb of material per batch, and each drying an average of two batches per day. Although there was no dust problem during the loading of the dryers, since they receive the product in the form of a moist filter cake, a dusty condition developed at the end of the drying cycle when machines are unloaded by hand. The operator unloads each dryer by drawing the product out of it with a large wooden hoe. The material falls into a hopper and fine particles would billow up and disperse into the working area during the half hour unloading operation.



SOLUTION: Hooding for each dryer was designed, with each hood and duct sized to overcome dispersing air currents. Owing to very small particle size of the dust, a Dustube collector, manufactured by American Wheelabrator & Equipment Corp., Mishawaka, Ind., was installed to clean the air exhausted from the three dryers. The collector has hundreds of square feet of filtering cloth in the form of hundreds of individual cotton sateen tubes. At predetermined intervals, these tubes are mechanically shaken and the collected dust falls down into hoppers from which it is returned to product batches.

RESULTS: Since cloth filtration is capable of high efficiency when handling small particles, the working area is kept clean and material that was formerly lost to the atmosphere in the form of dust is reclaimed. Working conditions and plant appearance have been improved.

Waterless Cooler Fits Hotel Needs

PROBLEM: Mounting water bills, the prospect of a new increase in city water rates, and restriction of water usage were factors affecting the decision to air condition a newly redecorated lounge at the Hotel Hildebrecht, Trenton, N. J.

SOLUTION: A 15-ton system was installed using a Unicon remote type air-cooled condenser which requires no water supply or plumbing. This condenser is made by Kramer-Trenton Co. The lounge is arranged so that it can be divided into two sections by folding doors. The dual nature of the room required the installation of two separate air conditioning units. The waterless condenser was arranged to serve two 7½-hp York air conditioners which cooled both the lounge and its adjacent Wedgewood Room. The condenser is constructed so that it can be used as a one or two circuit unit. Each compressor is connected to one circuit of the condenser. The compressor is located on the roof two stories above the compressors. Refrigerant is piped through the kitchen to the condenser, a distance of 60 feet from the cooling units.

RESULTS: A flexible system capable of serving two areas, either separately or at one time, has been installed. Light weight of the condenser unit permitted it to be carried to the roof without special rigging. No structural changes were required to strengthen the roof. No objectionable noise from the condenser penetrates the roof to annoy guests. There is no addition to the water bill and no need for maintenance of cooling tower or water supply to the air conditioning unit.

COMPACT COOLING TOWERS OF GROWING IMPORTANCE IN RESIDENTIAL COOLING

Market surveys reveal that the sale of room air conditioners for homes has increased by 600% since 1947. In 1952, total sales of both cabinet and window types for homes was 251,000 units. Substantial gains were registered in 1952

and the 1953 figures are expected to surpass 500,000 units. It is expected that the trend will swing to built-in central cooling system. Residential air conditioning, which originally "caught on" in volume in the Southwest is rapidly moving North and East in popularity...and promises to be an even bigger market in 1954.

To meet the need for adequate cooling towers for "built-in" residential air conditioning installations, the Binks Manufacturing Co. has introduced an *extra quiet* unit which can be located in the basement, garage or yard. This compact cooling tower is Model B-23-B. It is designed specifically for home use, is furnished complete with a small cir-

culating pump. It is blower driven by a single motor. This is suitable for loads from two to three tons commonly offered to the consumer market.

Full information on this specially-designed, moderately-priced unit may be obtained by writing direct to the manufacturer, Binks Manufacturing Company, 3120-38 Carroll Ave., Chicago, Ill. Ask for Bulletin 47-C. The new unit is now in production. ADV.

Achieve maximum cooling WITHOUT NOISE!

Binks
SERIES 3-B
Cooling Tower

- Only dry air passes through the air propulsion assembly. This reduces corrosion and maintenance.
- Non-clogging ROTOJET nozzles produce maximum cooling. The whirl chamber causes fine fluid break-up.
- Air current moves up in opposite direction to downward water flow, thereby accelerating the cooling rate and volume.

For use indoors or out, a Binks *blower-type* cooling tower provides the cooling efficiency you want—*plus* easy, *low-cost maintenance*... and smooth, *silent*, dependable operation. A Binks type 3-B tower is *extra quiet* because its squirrel-cage blowers provide ample air movement while running at slow speeds.

Binks spray-deck construction steps up cooling efficiency by "filming" the water to expose more surface to the cooling air. This assures maximum heat transfer. *Controlled* air movement through the tower makes it independent of natural breeze.

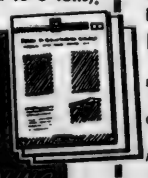
You pay no more for this extra performance when compared with other equipment of similar size.

A COMPLETE LINE OF NATURAL DRAFT AND MECHANICAL DRAFT COOLING TOWERS AND INDUSTRIAL SPRAY NOZZLES

REPRESENTATIVES IN ALL PRINCIPAL CITIES • SEE YOUR CLASSIFIED DIRECTORY

SEND TODAY for these bulletins:
No. 47-A—Type 2-B (3 to 30 tons);
No. 47-B—Type 3-B (1 to 108 tons);
No. 47-C—Type B-23-B (2 to 3 tons).

Binks
EVERYTHING FOR WATER COOLING



MAIL COUPON TODAY!

Binks Manufacturing Company,
3120-38 Carroll Ave., Chicago 12, Ill.

Gentlemen: Please rush FREE Cooling Tower Bulletins as checked:

☐ Bulletin 47-A ☐ Bulletin 47-B ☐ Bulletin 47-C

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

Incubation Controlled Electronically

PROBLEM: Close control of temperature and humidity is one of the important requirements during incubation periods for turkey eggs at the Trask Turkey Farms in Wisconsin. As production increased over the years, control became more and more costly and uncertain.

SOLUTION: Electronic instruments developel by Minneapolis-Honeywell's Industrial Division were installed. Electronic recorders located in the center of the hatchery serve as a central checking point for temperature and humidity at various locations in the plant. Within each incubator, a fan circulates air over 2200 to 9000 eggs. Resistance bulbs sense wet and dry bulb temperatures and transmit the values to the electronic recorders.

RESULTS: The slightest variation in temperature or humidity in any of 20 incubators can be determined immediately and correction measures taken. Greater yields and healthier poults are developed at the hatchery. Strip chart instruments not only serve as guides to operation of the incubators, but also provide a daily log of incubation progress.

Carbon Deodorizes Sea Food

PROBLEM: At the Davy Jones Sea Food House in New York's Radio City, the odor of fish cooking and in process of preparation was objectionable.

SOLUTION: An engineering survey showed that circulation of air in the restaurant was from the basement, where the fish are processed, up the stairs and out the front door, where odors hit guests as they entered. While this circulation route aggravated the problem by picking up basement odors, the solution was made easier because the odors could be isolated at the source and channeled through the Pur Air activated carbon filters installed by the Pur Air Division of Barnebey-Cheney Co. of Columbus, Ohio. One carbon unit was placed at the bottom of the stairs and another at the top.

RESULTS: The manager of the restaurant reports that the objectionable odors have been entirely removed and at a cost lower than some other systems which had been previously tried.

Boiler Heats Fire Boat

PROBLEM: After 35 years of service the heating boiler on the fire boat Cascade, smallest of Baltimore's four harbor fire boats, required replacement. Space on a fire boat is limited and must be efficiently used. Therefore, a replacement had to have dimensions that fitted the small space available.

SOLUTION: Chief William H. Stagge, repair shop chief of the Baltimore Fire Department, selected an H-104 cast iron heating boiler made by The National Radiator Co. With a net rating for hand firing of 370 sq ft E.D.R. water, the new boiler is only 21 inches deep by 15 inches wide and stands 50 inches high. The boiler is installed on a concrete floor below the after-deck and uses No. 3 anthracite.

RESULTS: Engineer Thomas H. Seelig of the Cascade reports the new heating plant has shown improved circulation of hot water and less fuel waste than its predeccessor. The drawer-type ash receiver simplifies ash removal and prevents spillage around the boiler.

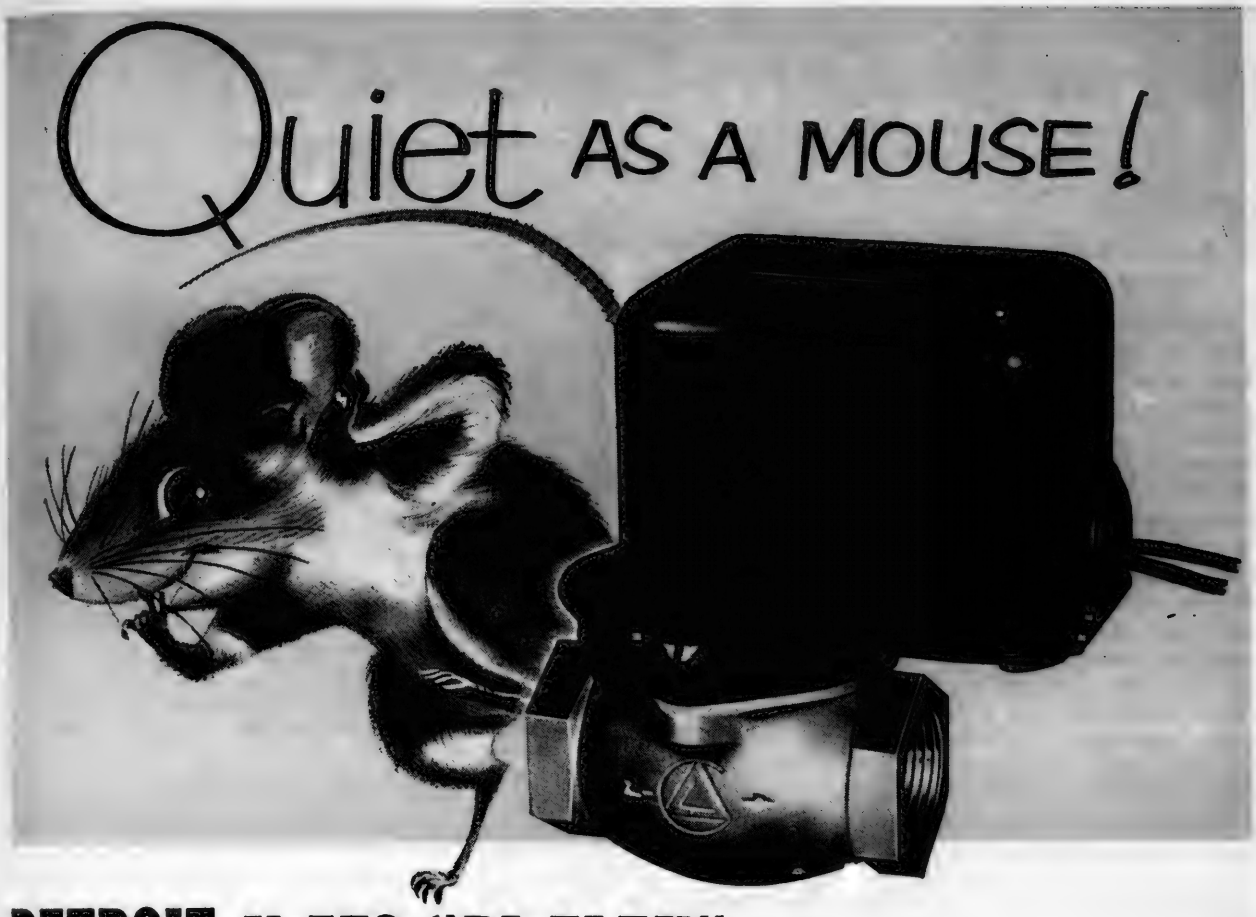
Humidity Controls Comfort

PROBLEM: At the Doehler-Jarvis plant in Toledo, a plan was required which would allow office spaces to be air conditioned for comfort while avoiding any chill or shock to personnel who were required to make frequent trips between the air conditioned office space and the untreated factory spaces. Temperature differences were to be held within 5 degrees.

SOLUTION: A Kathabar humidity control unit, product of Surface Combustion Corp. of Toledo, maintains a constant relative humidity of 45%. Excess moisture is absorbed by a lithium chloride solution. A cooling system automatically maintains a 5-degree temperature differential between office and factory spaces. The amount of dehumidification varies in accordance with the delivered air temperature required to maintain the 5-degree differential.

RESULTS: Persons who frequently have to pass from conditioned office spaces to unconditioned factory spaces do not experience any chill or shock caused by continual readjustment to large temperature differences. Evaporative capacity of drier air in conditioned spaces maintains the sensation of comfort.

Quiet AS A MOUSE!



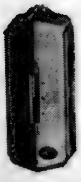
DETROIT V-579 "BI-FLEX"

The Quiet-Acting GAS VALVE—Performance Proven for Reliable Service on Thousands of Installations!

Check These Features

- Quiet operation—no click, no hum
- Rugged, compact—easy to service
- Inexpensive
- For all gases in all localities
- "Bi-flex" motor operated—low voltage
- Compensated for changes in ambient temperature
- Snap-acting opening and positive closing
- ½-inch to 1¼-inch sizes

Here is a gas valve which is actually quiet in operation! Its strong "Bi-flex" motor provides unfaltering opening and tight shut-off closing with absolutely no annoying, worrisome bangs, clicks or hums. Thousands of installations have proved its unsurpassed reliable, trouble-free performance. Simple in design, positive in operation, the V-579 operates independently of gas pressure and is available in sizes to fit any domestic heating system. Write today for Bulletin No. 229.



NO. 411—*the sensitive and accurate Timed Cycling Thermostat for all types of heating systems. Provides close control of room temperature. Attractively styled, easily installed and adjusted. Write for Bulletin No. 193 and Form No. 1545-A.*

DETROIT CONTROLS *Corporation*

8900 TRUMBULL • DETROIT 8, MICHIGAN

Division of American Radiator & Standard Sanitary Corporation

Representatives in Principal Cities • Canadian Representatives in Montreal, Toronto, Winnipeg—Railway and Engineering Specialties, Ltd.

AUTOMATIC CONTROLS for REFRIGERATION

AIR CONDITIONING • DOMESTIC HEATING • AVIATION • TRANSPORTATION • HOME APPLIANCES • INDUSTRIAL USES

Serving home and industry

AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS

NEWS OF THE MONTH

SNOW MELTING COSTS

to be studied in sidewalk and driveway systems installed at University of Illinois.

Studies on the cost and the operation of a snow melting system are now being carried on at the I-B-R Research Home at the University of Illinois.

Coils were installed under the sidewalk and under the driveway of the Research Home. A total of 175 thermocouples was imbedded in the concrete when it was poured. The thermocouples are located so as to provide a temperature traverse clear across the driveway and across the sidewalk.

• **CONSTRUCTION.**—In the construction of the driveway, the pipe coils were arranged on 12 inch centers directly under each tire tread. In the sidewalk installation the pipes were arranged so that there is 15 inches between the two center pipes and 12 inches between the others. The sidewalk slab is 5 inches thick with the pipes so located that there are 2 inches of concrete covering the top of the pipes and approximately two inches of concrete between the pipes and the gravel fill.

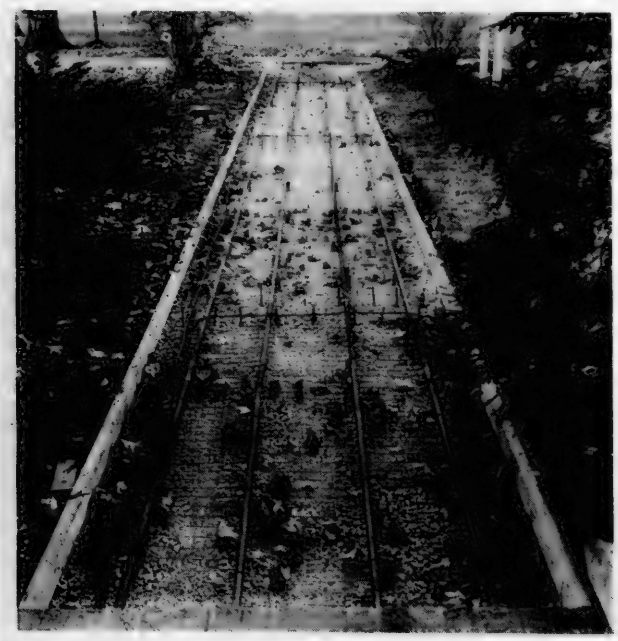
The system was designed so that the coils under the walk may be operated independently of the coils under the driveway. The system is manually controlled.

All the coils in the sidewalk as well as the driveway are made of ¾-inch black iron pipe. They are joined together in the basement of the Research Home to a common supply and return made of 1¼ inch pipe.

Pipe arrangement at the porch. The uppermost pipe serves as the supply for both circuits and runs approximately 2 inches below the surface of the step, serving to keep the step free of ice and snow. The circuit arrangement in the sidewalk is basically the same as that used in the driveway.

The same boiler which is used to heat the I-B-R Research Home is also used to heat the water for the snow

(*Continued on page* 140)



Pipes in sidewalk are arranged with 15 inches between two center pipes and 12 inches between others. Re-inforcing mesh is directly under pipes in the first third of the walk and directly on top of the pipes in the last third. No re-inforcing mesh is used in the middle third. Slab will be 5 inches thick with 2 inches covering the top of the pipes.

Pipe at the garage door. Common supply crosses the drive just outside the door and serves both loops of pipe. The returns are in the background and are separately valved. This allows operation of either one or two circuits in the drive.

Condensate Pumps

LOW PRESSURE SYSTEM

LOW RETURN CONNECTION
LOW SPEED, LONG LIFE
CAST IRON RECEIVER
SINGLE OR DUPLEX

Specify the "Convertible" TVC in the 15 gallon receiver when ordering low pressure system condensate pumps.

Capacities from 500 to 10,000 sq. ft. E.D.R.

Available from Jobbers' Stocks

A SINGLE UNIT easily converted at any time to a DUPLEX UNIT

The Single Unit TVC Condensate Pump in a 15 gallon receiver can be converted to a DUPLEX UNIT whenever load or other conditions require. Each receiver is furnished machined and drilled for the addition of another pump and control.

Conversion to a Duplex Unit doubles the capacity of the unit, or where desired, provides a stand-by pump. Additional pump is installed right on the job. Removal of the unit is unnecessary.

• Dimensions

15 gallon cast iron receiver for single or duplex units: diameter 25½", height of return above floor—7 3/16".
10 gallon cast iron receiver (for single units only): diameter 21", height of return above floor—6⅞".

• Features

TVC Condensate Pumps are low speed (1750 RPM) for long life, are readily installed in area where space is important. Their compact cast iron receiver and sturdy pumping unit assure a trouble free installation.

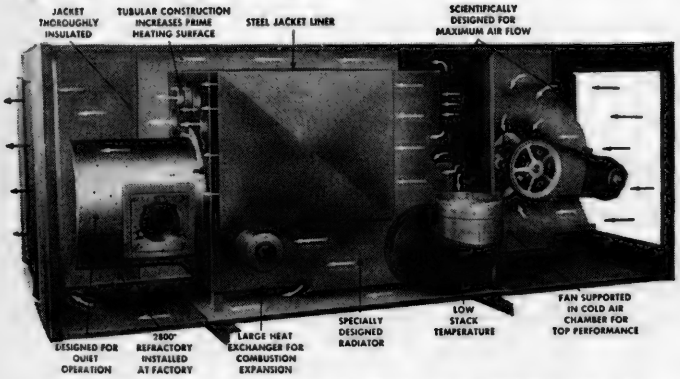
• Installation

Simple installation consists of connecting return line to receiver, and connecting discharge to boiler, using a check valve and a gate valve. Unit is completely assembled at the factory. Send for Bulletin TVC300.

weil PUMP CO. 1516 N. FREMONT ST. • CHICAGO 22

Wondaire . . . OUTSTANDING DESIGN

MEANS MORE SALES FOR YOU IN '54


JACKET THOROUGHLY INSULATED
TUBULAR CONSTRUCTION INCREASES PRIME HEATING SURFACE
STEEL JACKET LINER
SCIENTIFICALLY DESIGNED FOR MAXIMUM AIR FLOW
DESIGNED FOR QUIET OPERATION
2800° REFRACTORY INSTALLED AT FACTORY
LARGE HEAT EXCHANGER FOR COMBUSTION EXPANSION
SPECIALLY DESIGNED RADIATOR
LOW STACK TEMPERATURE
FAN SUPPORTED IN COLD AIR CHAMBER FOR TOP PERFORMANCE

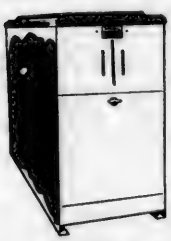
EASY-TO-SELL TROUBLE-FREE, OIL FIRED HEAT

Cash in on the tremendous demand for horizontal-type furnaces —write for attractive dealer or jobber sales plans. Increased production brings better delivery—and you can meet or beat all competition for practical, well-made, efficient furnaces. Domestic furnaces have same outstanding features, high quality construction and efficient performance as the horizontal-type units.

COX MANUFACTURING COMPANY
RIDGEVILLE, INDIANA
EXCLUSIVE MANUFACTURERS OF WONDAIRE DESIGNED FURNACES

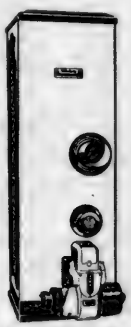
WORLD'S FINEST OIL OR GAS FURNACES

Expansion of plant facilities enables us to add a limited number of jobbers and dealers to our lists. Wondaire, without a doubt, is the world's finest horizontal-type oil or gas fired furnace. Sizes from the smallest to the largest are available including: 80,000; 95,000; 115,000; 150,000; 225,000; 300,000 and 400,000 BTU. Shipped completely assembled—all parts standard and nationally known.



MODEL R
115,000 to 212,000 BTU

MODEL H
80,000 to 150,000 BTU



MODEL CFO
80,000 to 150,000 BTU

MAIL THIS COUPON NOW!

SEND ME COMPLETE INFORMATION ON—

☐ Horizontal ☐ Model R
☐ Model H ☐ Model CFO

Name .....
Address .....
City & State .....

AIR

IS OUR BUSINESS

FIFTY-TWO YEARS
OF EXPERIENCE ENGINEERING
AND MANUFACTURING
VENTILATORS IS AVAILABLE
TO YOU . . . . ON REQUEST!

If you have a ventilating problem, Burt Engineers and case histories from thousands of time-tested Burt installations stand ready to help you. Burt holds no brief for any specific type of roof ventilator. The Burt line is complete — with a type and size for any need. If modified or special designs are required, Burt can design and fabricate them — economically.

If your problem is specific, give us the details. We'll recommend the solution. If it is general, write for the latest Burt catalog with data and descriptions of Burt's complete line.

FAN & GRAVITY VENTILATORS • LOUVERS • SHEET METAL SPECIALTIES

The Burt Manufacturing Company
49 E. South Street, Akron 11, Ohio
Member Power Fan Manufacturers Association

SNOW MELTING COSTS

(*Continued from page* 138)

melting system. A heat exchanger similar to that used for the indirect heating of domestic water, but larger in size, was installed. An anti-freez solution is used in the water which circulates between the heat exchanger and the coils in the sidewalk and in the driveway.

NEW HEATER

generates own thermoelectric power to drive circulating fan. Thermopile is built into fire box.

A space heater, which generates its own thermoelectric power for forcing the hot air into circulation over the room, has been devised by Frederick J. Bordt, Jr., associate professor of mechanical engineering at Rensselaer Polytechnic Institute.

• **FOR ARMY.**—A patent, covering the new and essential elements built into the space heater in three years of research, was recently granted to Professor Bordt and Andrew J. Shine who was the former's associate on the project in the first year's work. The patent has been assigned to the Army's Quartermaster Corps which supported the research at Rensselaer as a part of its program for developing highly efficient space heaters for Army installations in cold climates.

• **OPERATION.**—The heater, through the patented thermopiles built into the walls of the combustion chamber, develops sufficient power to operate four small fans. These suck in the cold air from the low level and blow it out of the top level after it has been heated through close contact with the exhaust pipe from the combustion chamber. The heated air is thus discharged at high velocity to blanket the ceiling and walls with warm air. The pilot model, with a combustion chamber about 10 inches in diameter and a foot in height, employed gasoline as a fuel but any liquid fuel such as kerosene or jet oil can be used. The long heat exchanger, sitting on top of the combustion chamber, makes the top of the heater about as high as a normal room ceiling.

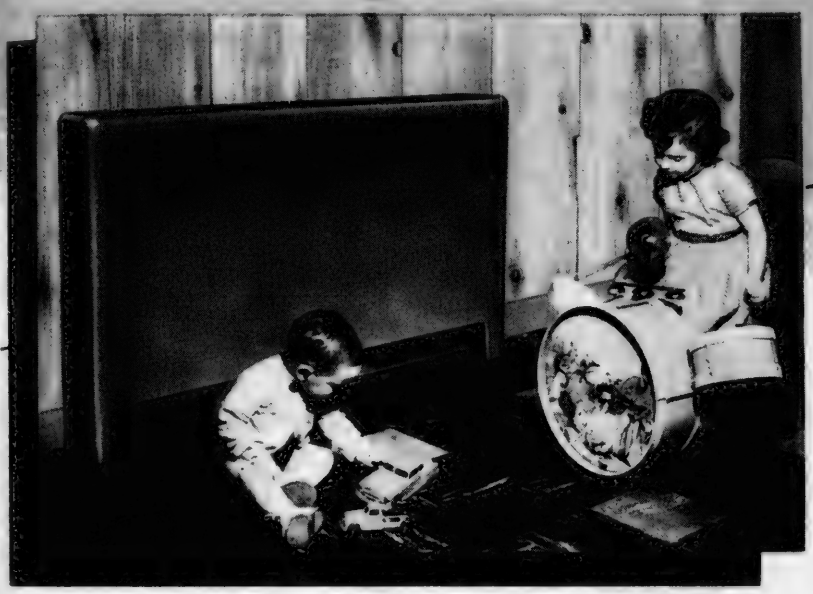
• **CONSTRUCTION.**—There are 2,400 thermo-couples built into the walls of the combustion chamber, each of them consisting of two small metal pins about the length of an ordinary kitchen match and about half its diameter, and connected with wires. The pins are set about a quarter-inch apart in horizontal rows about a quarter-inch apart and are arranged in four by seven inch panels. There are eight of the panels in all, two being required to develop two and a half watts of power for operation of each of the four fans.

Each of the pins extends a half-inch into the combustion chamber, runs through the half-inch ceramic insulating wall which forms the combustion chamber, and extends three-fourths of an inch into the cold outside air. The hot end of the pin is stainless steel, the cold end is copper, the current flowing from the hot end to the cold end. The pins are connected inside the ceramic wall with wires

(*Continued on page* 142)

IT'S CHILDS PLAY...

TO HANDLE BUSH CONVECTORS

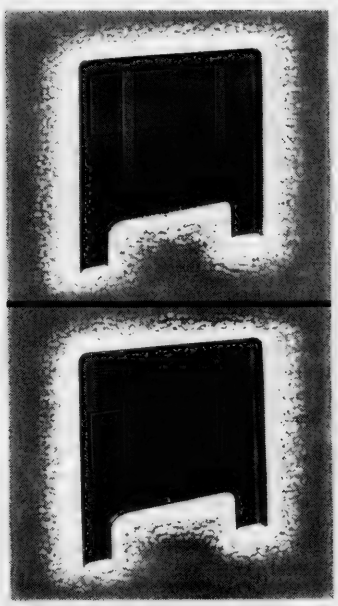


They're easy as A, B, C to install. And their attractive cabinet design . . . including large, safety-rounded corners . . . makes a big hit.

But the best part is what's *under* the cabinet: all copper and aluminum heating elements for long, trouble-free operation . . . adjustable mountings for pitching the element in either direction . . . ample discharge grille opening for unimpeded air circulation. And all case parts are phosphate treated for corrosion resistance before painting.

BUSH Convectors can help you open up the brisk new market for playroom and basement heating . . . the desire of home owners to add another room.

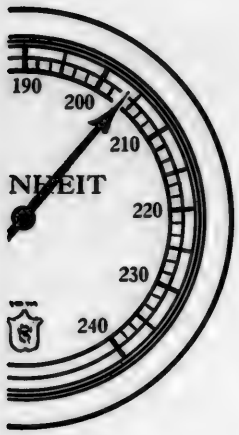
Check today on the many other advantages of BUSH Convector Radiators. Request free bulletin containing complete information and specifications.



To add dampers to existing installations, remove front panel (only 2 screws to loosen), slip carrying strips over formed-on tabs, drop damper in place.

BUSH MANUFACTURING COMPANY
WEST HARTFORD 10, CONNECTICUT

BUSH



if high fuel oil temperatures are what you need—the Paracoil TYPE "GF"*

INDIRECT GAS FIRED FUEL OIL HEATER is the answer!

With sub-water-line oil heaters, a low circulating boiler water temperature can play havoc with even the best engineered No. 6 oil burner layouts—particularly with the viscous oils now being used!

Our Type "GF" Indirect Gas Fired Heater can give you any desired oil temperature you want—without the use of expensive electric boosters!

APPLICABLE TO ALL TYPES OF OIL FIRED APPARATUS!

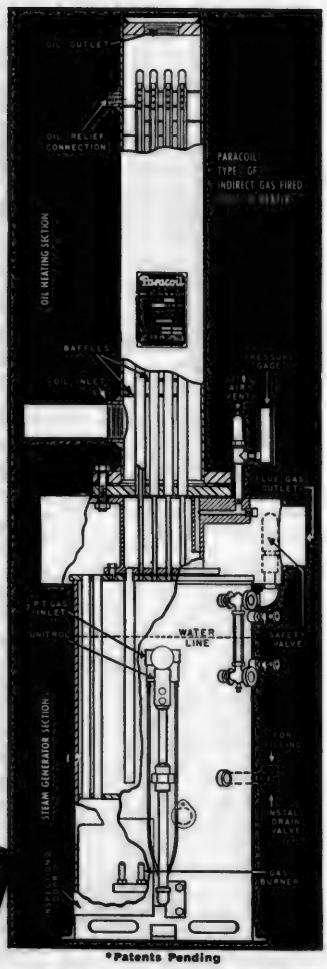
As it is not dependent upon the unit it is servicing for the means of heating the oil, the Type "GF" Heater can be applied to any oil fired apparatus, be it a steam or hot water boiler, a process oven, a dryer or a kiln!

ONE HEATER CAN SERVE MANY BURNERS!

No steam piping required. Heater operates on a closed, internal steam and condensate cycle!

CHECK THESE FEATURES!

Completely factory assembled • Easy to install anywhere, even outdoors • Requires only minimum of floor space • Economical to operate • Wide range of oil heating capacities • Burns any specified type of gas fuel • High oil temperatures at all times • Operation unaffected by normal variation in viscosities of oils being heated.



*Patents Pending

Write today for BULLETIN 60-L

Approved by Board of Standards and Appeals City of New York

DAVIS ENGINEERING

CORPORATION

1064 EAST GRAND ST., ELIZABETH 4, N. J. • 30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

NEW HEATER

(*Continued from page* 140)

of chromel and constantan, and the accumulating current is fed off into the trunk line serving the fan's rotor.

The development of the heater brought many difficulties beyond the tremendously detailed task of placing the 4,800 pins in proper position. It was necessary to find a ceramic wall which is both heat and electric insulating and which would not shrink after pouring. Special ceramic mixtures were obtained from industry and were adapted to use in the heater through long experimentation.

• **USES.**—Professor Bordt thinks the space heater may be adapted to wide use and that its cost can be brought within reasonable range through machine methods of assembling the pins and casting them into the ceramic panels making up the fire box. An interesting possible use of the heater, he said, is in taking care of the heating needs of remote units and affording them a supply of electric current for operation of a radio call device in emergency. The heater will keep on developing current as long as the fuel lasts.

AIHA

to meet in Chicago with four other groups concerned with industrial health, medicine, and environment.

More than 100 specialists in different phases of industrial hygiene will speak before the meeting of the American Industrial Hygiene Association, which will be held April 26 to 29 as a part of the 1954 Industrial Health Conference, at the Hotel Sherman in Chicago.

High points of the meeting will come Wednesday and Thursday, when concurrent sessions will touch over 50 different aspects of air pollution, chemistry and analysis, engineering, radiation and toxicology. Experts in these fields will share their knowledge with the hygienists.

• **PROGRAM.**—The AIHA will open its convention April 26, with industrial hygiene tours of the Ekco Products Co., Swift & Co., Underwriters Laboratories, and the W. F. Hall Printing Co.

The first general session, on Tuesday morning, will feature noted hygienists speaking on topics ranging from "Evaluating Industrial Skin Exposure", to the problem of noise hazards.

Tuesday afternoon, the AIHA will hold a joint session with the American Conference of Governmental Industrial Hygienists. The meeting will include discussions on industrial hygiene instruments as well as solvent vapors, dusts, gases and metal fumes.

Meeting with the Industrial Medicine Association on Wednesday, hygienists will hear an analysis of the responsibility of the professions in health education of the employee. Participating will be an industrial physician, industrial hygienist, industrial nurse and industrial psychologist.

• **PATTY LECTURES.**—Climaxing the hygienists' meeting

(*Continued on page* 146)

TEST of TIME

Lawler's longer-lasting Quality insures YOUR reputation!

Lawler's "Performance-Tested" design combines pioneering experience with engineering leadership. The use of specially chosen metals assures YOUR customers years of positive, accurate temperature control with lowest maintenance cost . . . the best insurance YOUR REPUTATION can have!

TYPE "S" Temperature Regulators

For accurate temperature control of steam heated hot water tanks . . . vats . . . preheaters . . . process tanks

PLATE NO. 2051

Compare!

List the facts . . . Check them off . . . Lawler comes out first every time! YOUR REPUTATION is protected!

LAWLER TYPE "S" TEMPERATURE REGULATOR

- Hydraulically formed one piece bellows.
- Smaller range spread for more accurate control.
- Polished stainless steel valve stems.
- Bronze ball bearing knurled adjustment wheel.
- Non-ferrous thermostat and bracket assembly.

The Lawler Line — Thermostatic Controls

"Performance-Tested" for Longer Life

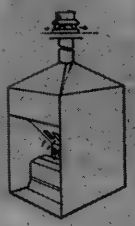
STEAM TEMPERATURE REGULATORS · SHOWER MIXING VALVES · WATER CONTROLLERS · TEMPERING VALVES

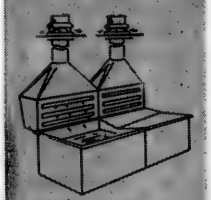
LAWLER AUTOMATIC CONTROLS, INC.

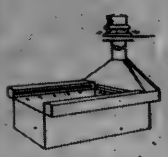
453 North MacQuesten Parkway Mount Vernon, New York

You Can Be Sure GALLAHER CERTIFIED RATINGS mean Peak Performance

HERE'S WHY







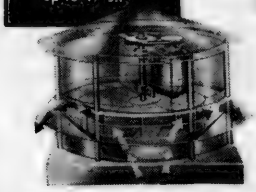
Gallaher ratings are the result of actual physical tests of the entire unit—*not* a fan wheel alone or other component, *not* interpolations of free air data, but a true picture of the unit as it operates under actual conditions.

Any other method of rating a power roof exhauster will be inaccurrate. Gallaher research has shown conclusively that the errors may run as high as 50% when ratings are mere theoretical calculations.

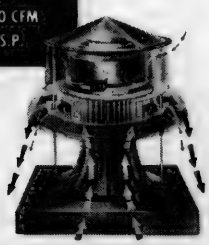
Gallaher units with patented, built-in *scroll effect* are the only power roof exhausters which can develop high static pressures. With this feature, thousands of industrial applications are well within the range of economical power roof exhausters. They have been rated in an independent laboratory under the direction of a nationally recognized authority under the conditions prescribed by NAFM and ASH&VE.

Before you buy power roof exhausters we think you'll agree that these three questions should be answered to your satisfaction. 1. How were the tests conducted? 2. Did it include the whole unit and not a component? 3. What impartial authority conducted the tests? We think that you'll buy Gallaher Air-Vans.

NEW Belt Drive 4000 to 65,000 CFM up to 4 S.P.



Direct Drive 100 to 11,000 CFM up to 4.2 S.P.



Pat. No. 2526290 2188741 Pats pending

For full information write Dept. V-7

The GALLAHER Company

4108 DODGE STREET OMAHA, NEBRASKA

JUST PUBLISHED!

A BASIC

by

C. Harold Berry

Gordon McKay Professor of Mechanical Engineering

Graduate School of Engineering

Harvard University

COMPLETE TABLE OF CONTENTS

1. Factors in Gas Flow Measurement. —Quantities Characterizing Flowing Fluid—Head—The Bernoulli Equation —Bernoulli Equation in Terms of Pressures—Measurement—Units—Influences of Elevation—Computation of Head—Relation Between Velocity and Velocity Pressure

2. Pressure and Loss Calculations.—Abrupt Expansion—Losses Due to Abrupt Expansion—Pressures in a Duct System—"Negative" Static Pressure—types of Flow—Reynolds Number

3. Losses in Straight Uniform Ducts. —Losses in Laminar Flow—Losses in Turbulent Flow—Losses in Straight Duct—Hydraulic Mean Radius—Value of Friction Coefficient—Friction Loss, Total Pressure and Static Pressure—Friction Charts—Friction Loss Related to Velocity and Quantity—Variation of Friction Loss—Fifth Powers of Numbers—Friction Loss in Rectangular Ducts

4. Losses in Diverging Passages. Friction and Shock Loss—Nomenclature —Abrupt Expansion—Friction Loss in Tapering Enlargements—Influence of a Downstream Duct

5. Losses in Converging Flow. The Rounded Entrance Nozzle—Sharp Edged Orifice—Converging Tapers—Influence of a Flange—Effect of Non-Uniform or Non-Axial Flow through a Duct—Loss in Elbows—Loss in Tees and Other Fittings

6. The System Considered as a Whole. System Losses—Rise in Static Pressure —System Resistance—Changing the System Resistance—System Resistance and Pressures—Power to Move Gas—Power to Accelerate Gas—Power to Move and Accelerate—A Complete Installation—"Static Horsepower"—Variation of System Resistance and Power with Flow and Fluid

7. Fan Performance. The Fan—Series of Similar Fans—Fan Performance—Dependent Variables—Independent Variables—Influence of System Resistance —Centrifugal Fan Types—Their Characteristics—Axial Flow Fans—Their Characteristics—Equivalent Orifice—Fan Rating—Fan Load or Duty—Fan Performance on Test and in Service

8. Effect of Variables on Fan Performance. Dimensionless Constants for Fans—Equivalent Orifice—Mechanical Efficiency—Volumetric Efficiency—Manometric Efficiency—Specific Speed—Dimensionlessness-Fan Laws

9. Fan and System. Density Effects—A Mixed System—Reduction of Test Results—Accuracy—Accuracy of Fan Laws and Constancy of Dimensionless Constants—Model Testing—Converting Fan Performance Data—Test Curves—Computed Curves

10. Selecting a Fan. Selection for Specified Duty by Dimensionless Constants—Selection by Using Fan Laws —Selection for a Given Duty by Various Methods—The Engineering Decision—Influence of Changes in Specifications—Effect of Changing Volume—Two Fans in Parallel—Effect of Changing System Resistance—Two Fans in Series —Effect of Changing Speed—Effect of Changing Gas Density

11. Fan Selection and Rating. Graphical Method of Selecting a Fan for a Given Duty—Tip Speed—Computing Tip Speed of Test Fan—The Orifice Ratio—Tip Speed Curves—The Hagen Diagram—Fan Rating or Capacity Tables—Effect of Errors in Computing System Resistance—Changes to Compensate for Errors—Margins of Alleged Safety

12. Fan Operation and Control. Fan Control on Variable Duty—Damper Control—Variable Speed Drive—Vane Control—Comparative Merits of Damper, Speed and Vane Control—Combination Control

EXAMINE "FLOW AND FAN" FREE!

Send for your copy of "Flow and Fan" under our Five Day Free Inspection Plan. Just mail the coupon at the right and the book will be sent to you postpaid. Examine it for five days, and return it to us if you are not completely satisfied with the usefulness of the information it contains.

TEXT ON AIR HANDLING

A new book for students and practicing engineers which covers the principles of moving air through ducts, including elements of fan selection and control, duct arrangement and resistance, system characteristics and flow analysis.

"Flow and Fan" will help you solve your problems involving the moving of air through ducts, and the selection and control of fans. It covers the *how* and *why* behind the basic calculations in the design of systems, and the information it contains is applicable to the actual problems you meet in ventilating work.

The title is derived from the two major divisions of the book: the *flow* of gas through duct systems, and *fan* performance and control. Seven chapters on gas flow give the basic data you need and describe the methods you can use for calculating system resistance. The final six chapters are devoted to information that will help you in the practical task of selecting a fan for a given duty. "Flow and Fan" will meet the needs of students who are interested in acquiring a working knowledge of ventilation, and will be useful to practicing engineers as well. The author's treatment of topics like equivalent orifice and the space-saving Gibson tapered enlargement are worthy of attention of the most advanced engineers, while other portions are at a more elementary level for those who need an introduction to the subject. Other subjects covered include: factors in gas flow measurement, head, density, pressure, boiler draft, losses in laminar and turbulent flow through various shapes of ducts, fan types and performance, fan selection and model testing.

The author, Professor C. Harold Berry, possesses both engineering and teaching experience; and in addition he has the rare ability to write entertainingly about a technical subject without oversimplification, but with practical attention to the limits of engineering accuracy. In writing "Flow and Fan" he has kept in mind that the book is intended for readers at various levels of preparation. For example, in some cases the need for a given result is shown before the subject is developed. Teachers and students alike will recognize this as a sound approach. In every case where adequate information is difficult to find elsewhere the subject is developed fully, while standard reference material is held to a minimum.

If you are concerned with problems involving the moving of air through ducts and the selection and control of fans, you will find in "Flow and Fan" a wealth of basic information. Send for a copy of this book today. Pay for it only after you have read it, and used it, and seen for yourself how helpful it will be. Just fill in and mail the convenient coupon below. "Flow and Fan" will be sent to you immediately, postpaid.

232 Pages **$4.00** **84 Illustrations**

Postpaid in U. S.

MAIL THIS ORDER FORM TODAY!

THE INDUSTRIAL PRESS, 148 Lafayette St., New York 13, N. Y.

Please send me a copy of "Flow and Fan" postpaid.

☐ I enclose payment in full. ($4.00 in U. S., $4.70 in Canada and overseas.)

☐ Send under Five-Day Free Inspection Plan (for U. S. only)
Bill me ☐ Bill Company ☐.

Name .....

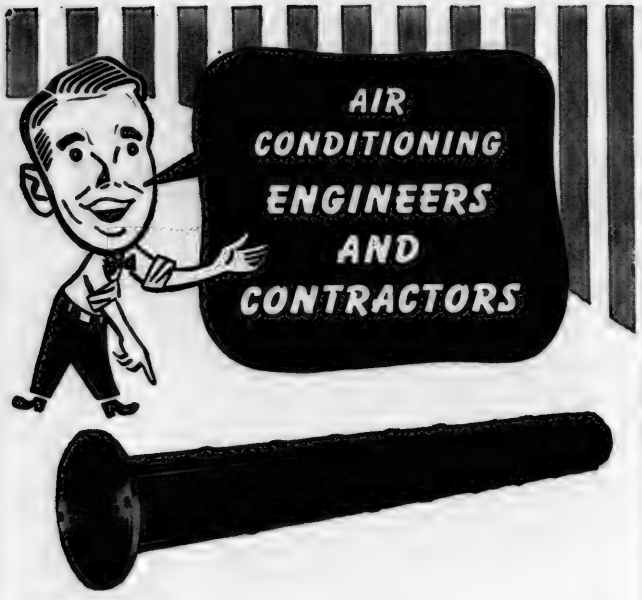
Address .....

City ..... Zone ..... State .....

Position* ..... Firm* .....

*This information would be appreciated for our records.

HV-4-54



Taco

"CONTROLLED VELOCITY" CHILLERS

1. Improved heat transfer
2. No oil logging or slop over
3. Rapid response to Thermal Expansion Valve

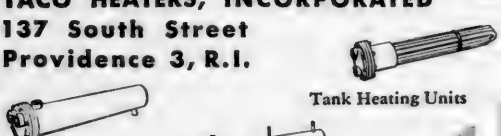
HERE ARE THE FACTS . . .

- All incoming liquid is carried to the top of the Chiller in the first pass.
- All refrigerant and oil are in constant movement forward.
- No liquid (refrigerant or oil) can accumulate in any part of the Chiller.
- At each head pass, liquid refrigerant and oil are agitated by a constant stream of expanding gas.
- Flow of refrigerant and oil is unretarded . . . free of "traps" and short radii.

For full details and application data, send for Bulletin CWF and schematic on "Controlled Velocity".

Circulating Pumps

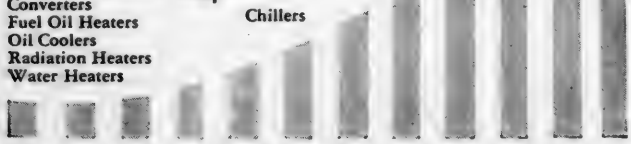
TACO HEATERS, INCORPORATED
137 South Street
Providence 3, R.I.



Tank Heating Units

Condensate Coolers
Converters
Fuel Oil Heaters
Oil Coolers
Radiation Heaters
Water Heaters

Chillers



AIHA

(*Continued from page* 142)

will be the annual banquet Thursday, followed by the Donald E. Cummings Memorial Lecture by Frank A. Patty of the Industrial Hygiene Department, General Motors Corporation.

The theme of the 1954 Industrial Health Conference is "Protecting our greatest industrial wealth—employee health." The Conference also includes meetings of the Industrial Medical Association, American Association of Industrial Nurses, Inc., American Association of Industrial Dentists and American Conference of Governmental Industrial Hygienists.

AIR POLLUTION

to get 47th annual examination in 35 technical papers at Chattanooga meeting.

The only meeting devoted exclusively to air pollution and its control to be held in this country, will be at the Patten Hotel, Chattanooga, Tennessee, on May 3, 4, 5, and 6. This is the 47th Annual Meeting of the Air Pollution Control Association. Headquarters of the association are in Mellon Institute, Pittsburgh, Pa. Some 600 executives, research scientists, and air pollution control officials will attend the four-day meeting.

• **PROGRAM.**—Thirty-five technical papers will be presented covering the subjects of coal, incineration, petroleum, municipal problems, dusts and fumes, steel, odors, measurements, and meteorology. The last day of the meeting will be set aside for plant inspection trips to study air pollution and control devices. This is the only annual association meeting at which air pollution control equipment is exclusively exhibited.

• **WHO.**—W. C. L. Hemeon, director of engineering of Industrial Hygiene Foundation at Mellon Institute, is chairman of the Program Committee. Also active in planning the meeting are: Thomas C. Wurts, director of the Allegheny County Bureau of Smoke Control, Pittsburgh, president of the Association; R. M. Landon, ass't. to the general manager of the Manufacturing Dept., Gulf Oil Corp., Pittsburgh; H. P. Hobart, Gulf Oil consultant, Pittsburgh; and Fain W. Ingram, director, Air Pollution Control and Boiler Inspection, Chattanooga, Tenn., in charge of local arrangements.

The Air Pollution Control Association, formerly known as the Smoke Prevention Association, was founded in 1907 to fill the need for a group specifically interested in air pollution and its control.

• Robert V. McCallister has been appointed sales manager of the General Products Division of Glass Fibers, Inc. Mr. McCallister has been manager of the New York sales branch. Products of the company include lightweight thermal and acoustical insulation, quartz microfiber high temperature insulation, and glass fiber packaging and cushioning materials.

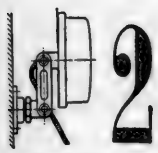
PALMER

mercury actuated Dial Thermometers now in three types to suit any requirements

1

Rigid Stem Dial Thermometer

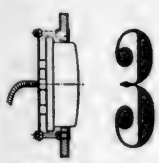
Rigid stem tapered bulb, interchangeable with standard industrial thermometer separable socket.



2

Wall Mounted Dial Thermometer

Wall mounted dial thermometer with flexible connecting armor. Case adjustable to easy reading position.



3

Flush Mounted Dial Thermometer

Flush mounted style for panel mounting with flexible connecting armor.

All three types have a full 4½" dial Face

PALMER
°F
PALMER THERMOMETERS, INC. CINCINNATI, O
Stem can be placed at any angle and case can be rotated to any readable position.

SEND FOR THIS BULLETIN
For details on the New Palmer Dial Thermometer, please write for Palmer Bulletin 51-129.

for accuracy: Mercury actuated . . . Fully Compensated by Invar Compensation. Guaranteed Accurate 1 scale division.

for angularity: Can be adjusted to most readable position at any angle desired.

for readability: Bold Black Numbers . . . 11" of scale Reading Dial face can always be placed in easiest readable position.

for interchangeability: Always specify "PALMER" Separable sockets as they are interchangeable for Dial or Industrial type Thermometers.

PALMER THERMOMETERS, INC.
Mfrs. of Industrial Laboratory Recording and Dial Thermometers
NORWOOD AVE., CINCINNATI 12, O.

SCALE • RUST [illegible]E

can ruin your pressure systems....

SOLVEX

(In tablet or granular form)

Is a POWERFUL, QUICK CLEANER for RAPIDLY and SAFELY destroying scale, rust, algae and dirt from boilers, radiators, water jackets, condensers, pipe lines, heating coils, air conditioning systems, etc. SOLVEX stops overheating and unstops congested water circulating systems.

SOLVEX is designed to clean the toughest corrosion from pipe, etc. in a matter of hours by merely circulating through the system. The crystaline materials in Solvex act as a protective agent to preserve and prevent rotting wherever wood is used in cooling towers, etc.

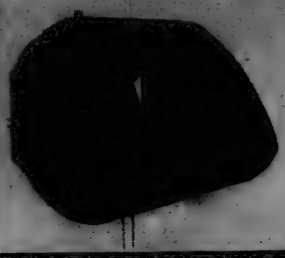
In the case of heavy corrosion, leakage may occur when the corrosion is dislodged. Chemical Solvent Co. cannot assume responsibility when this occurs. It is less likely to occur, however, with the use of SOLVEX than with most acids or other harsh and unsafe chemicals.

BE SAFE! USE SOLVEX!

Manufactured By

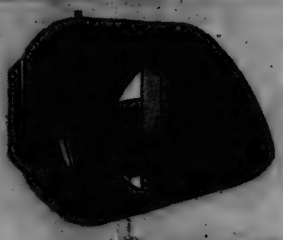
CHEMICAL SOLVENT CO.
3005 16th Street North Birmingham, Ala.

DISTRIBUTED BY
VIRGINIA SMELTING CO
WEST NORFOLK



DOWN-DRAFT VIEW

Gate opens outward to relieve down drafts which might affect flame. An optional safety switch closes main gas valve in case of prolonged down draft, thus providing full protection.



UP-DRAFT VIEW

Gate opens inward to regulate updrafts in conventional, proven manner, checking any excess in draft.

field

"MG" Draft Controls

ENGINEERED SPECIFICALLY FOR

GAS

fired industrial and commercial plants

1. Double acting gate opens inward to regulate up-drafts and outward to relieve down-drafts.
2. Adding or taking off weights provides simple adjustment for up-draft conditions at time of installation.
3. Control will relieve internal or down-draft pressures of only a few thousandths of an inch.
4. Weights attached to gate itself are factory set to insure extreme sensitivity to down-draft conditions.
5. Corrosion resistant knife edge bearings resting on self-aligning bearing plates assure extreme sensitivity yet long life.
6. Side wings improve the regulation, making the control accurate at all gate positions.
7. Long collar keeps gate out of the path of flue gases — resulting in greatly increased life.

The Field "MG" has met the most rigid municipal requirements for commercial and industrial installations. It is being used with full approval of the nation's leading gas companies in the nation's largest cities. Fully safe, fully proven, it provides for gas-fired installations the same accurate, dependable performance, the fuel economy so long provided by Field Draft Controls for oil and coal fired furnaces. Write for complete information.

FIELD CONTROL DIVISION

of H. D. Conkey & Company — Mendota, Illinois

AFFILIATES - Conco Building Products, Inc. — Brick, Tile, Stone
Conco Materials Handling Division — Cranes, Hoists

J. R. VERNON PASSES

J. Rexford Vernon, 58, vice president and sales promotion manager of Johnson Service Company, Milwaukee, died February 17 at his home in Waukesha, Wisconsin.

Mr. Vernon was born in Madison, Wisconsin, June 2, 1895. He was graduated from the University of Wisconsin College of Engineering in 1918. He served as a lieutenant of engineers in World War I, and worked for the State of Wisconsin Highway Department for a short time following the war.

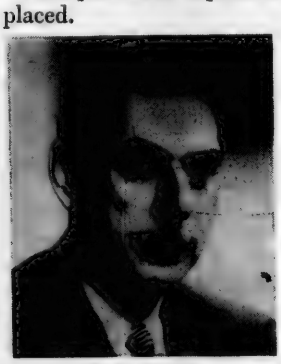
He joined Johnson Service Company in 1923 as a sales engineer in the company's Chicago office. In 1933 he was named advertising and sales promotion manager. His offices were moved to the company headquarters in Milwaukee in 1942. In addition to his duties as sales promotion manager, Mr. Vernon served progressively as assistant secretary and secretary of the company. He was elected vice president in 1952.

Mr. Vernon was a member of many years standing in the ASHVE and was a past president of the Illinois chapter in Chicago. After transferring to Milwaukee in 1942, he took an active part in the Wisconsin chapter of the Society, and was elected president in 1947. He served the national organization of the Society in many capacities, including the chairmanships of the Chapters Conference and Public Relations committees. He was a member of the Society's first elected National Nominating committee in 1947.

Mr. Vernon was also an active member of the Society for Engineering Education, and was member of the board of regents of the Milwaukee School of Engineering.

CORRECTION

The photographs of ASHVE President (1953-1954) Reg. F. Taylor and Anderson Medalist Walter L. Fleisher were inadvertently transposed by our printer in our March report of the Society's Houston Meeting. While these distinguished faces need no labels in this industry, we are pleased to reprint them with the captions correctly placed.



R. F. Taylor

W. L. Fleisher

HEATING AND VENTILATING'S *Ad-Digest* SERVICE

Below and on the following pages are given brief digests of the advertisements appearing in this month's issue. Use this Digest to locate and refer to the advertisements in which you are particularly interested, then fill out and mail the prepaid postcard to request further information from manufacturers.

NOTE: While every attempt is made to list all advertisements, those which are received after the published closing date may not appear. The Index of Advertisers lists all the advertisements in this issue.

WELDING NECK FLANGE. Pages 33-34. For most severe piping services involving high pressures and temperatures this engineered welding neck flange is recommended. The long tapered hub gives smooth transition between pipe and flange resulting in endurance strength equal to butt-joined pipe. An engineering service for flange requirements is offered. Booklet of dimension data available.....Item 201

AIR CONDITIONING. Page 162. A firm which engineers and manufactures a complete line of high quality refrigeration and air conditioning equipment.....Item 202

DIAL THERMOMETERS. Page 147. These thermometers are made in 3 types—rigid stem, wall-mounted, and flush-mounted to meet all requirements. Technical bulletin available.....Item 203

RESIDENTIAL AIR CONDITIONING. Page 154. A remote type, air-cooled condenser that completely eliminates water, sewerage and plumbing problems in connection with residential applications of air conditioning. Bulletin available....Item 204

POWER FASTENING. Page 151. A heavy-duty power fastener designed especially for plumbing contractors. This powder-actuated tool has speed, ease of use, utility and economy in fastening into steel up to one inch thick to the hardest concrete. Information available.....Item 205

ROOF FAN. Page 153. A power-driven roof fan being specified for commercial and industrial buildings because it is low in initial cost, easy to install, and of low overall height. Available in capacities from 750 to 4,500 cfm.....Item 206

CONDENSING UNITS. Page 57. A line of hermetic condensing units without belts, seals or manual oiling, and accessible for servicing on the spot. There is a unit for every type air conditioning installation from smallest to largest. Air cooled from ¼ to 3 hp., water cooled from 1/3 through 7½ hp. Details available.....Item 207

GAS VALVE. Page 137. A gas valve which is quiet as a mouse with no click or hum, rugged, compact and easy to service. Available in ⅜ to 1¼ inch sizes, this valve operates independently of gas pressure and provides unfaltering opening and tight shut-off closing. Bulletin available. .....Item 208

FUEL OIL HEATERS. Page 142. If high fuel oil temperatures are what you need, this indirect gas fired fuel oil heater is the answer. It gives any desired oil temperature without use of expensive electric boosters and is applicable to all types of oil-fired apparatus. Bulletin.....Item 209

POWER ROOF EXHAUSTER. Page 143. A power roof exhauster with ratings resulting from actual physical tests of the whole unit, not just components. A feature is the patented built-in scroll effect which can develop high static pressure. Information available.....Item 210

PACKLESS VALVE. Page 46. Packless valves for steam and hot water heating systems, coffee urns, steam kettles, sterilizers, ovens and similar service and which is packless in fact as well as in name. The metal-to-metal seal is permanently leak-proof. Information available.....Item 211

OIL PREHEATING. Page 155. An all steel shell and coil assembly for preheating No. 5 and Bunker C oils and other liquids to proper flow temperature. Details available.....Item 212

GAGES AND ANALYZERS. Page 153. Air filter gages, inclined and vertical draft gages, pilot tubes and portable gas analyzers for combustion testing. Bulletins available. .....Item 213

PERIMETER HEATING. Page 2. Perimeter heating with hot water for schools as exemplified in a modern low cost school in North Carolina. In case shown, heating contract was only 9% of the total construction cost. Information available. .....Item 214

HOT WATER PUMPS. Page 51. The most complete line of hot water heating pumps offering a range of heads and capacities which meet the requirements of residences, apartments, institutions, commercial and industrial buildings regardless of size. Features are listed. Catalog available. .....Item 215

FANS. Page 15. From inlet to outlet this company's type HL fan gives more air per dollar. The inlet bell is smoothly curved, inlet vanes reduce turbulance, rotor features smoothness, quietness and efficiency, and fan performance is stable from shut off to free air delivery. Engineering bulletin available.....Item 216

STEEL BOILERS. Page 45. These boilers are available in sizes from 129 to 2500 square feet of heating surface. The compact design makes them particularly adaptable to cramped boiler room area. Bulletin available.....Item 217

AXIAL FLOW FAN. Page 41. How these axial vane fans were used to exhaust the fumes from diesel locomotives in a roundhouse. Thirty-six fans were hidden in ceiling hoods and 726,000 cfm of fumes are exhausted before they contaminate the surrounding air. Air exhausted sometimes reaches a temperature of 280 degrees which has little effect on these fans. Bulletin available.....Item 218

COILS. Page 50. The Grand Ballroom of the Waldorf-Astoria has an air conditioning system installed 15 years ago but at that time the designers did not count on the full capacity crowds or the heat from TV lights which now presents a problem. Consequently, the air handling equipment had to be tripled to cool the ballroom adequately. After thorough investigation the engineers selected this line of coils which were tailor-made for the job. Information available.....Item 219

OIL AND GAS HEATING. Page 38. A line of oil and gas furnaces, conversion burners, horizontal oil furnaces, industrial oil burners and combination oil and gas burners which are profitable to sell, easy to install and service, give outstanding comfort and fuel economy and is comprehensive. Information available....Item 220

AIR HANDLING EQUIPMENT. Page 20. This company's air conditioning and ventilating equipment is used in many of the campus buildings of the University of Michigan including Angell Hall, a popular meeting place for students. This is the largest classroom building on the campus and every day thousands of students attend classes here. The company's supply and exhaust fans, humidifiers and heating coils are part of the building's conditioned air system. Information available .....Item 221

AIR CONDITIONING EQUIPMENT. Page 10. This line includes room air conditioners, packaged units, residential cooling and heating units, evaporative condensers and condensing units. Every product is built with quality material and workmanship. With this line you can handle any installation for home, office, store or factory. Information on franchise available. .....Item 222

COPPER TUBE. Page 43. This copper tube is easy to bend and thus makes radiant heating jobs easy for you and better for your customers. Its soft temper for easy bending and light weight for easy handling are among its advantages. A system made of this tube is corrosion resistant and can never clog with rust.....Item 223

AIR HANDLING EQUIPMENT. Inside back cover. 22 of the 24 manufacturing companies reporting assets of more than one billion dollars are users of this company's air handling equipment. The company specializes in air handling and air conditioning equipment. Line includes fans, air washers, packaged air conditioning units.....Item 224

DUCT CONNECTIONS. Page 159. Usually duct connections are made by attaching

Circle numbers corresponding to the advertisements in which you are interested, print your name and address clearly. Information will be sent directly from manufacturers.

PLEASE SEND US MORE INFORMATION.

Circle below item numbers on which you wish further information.

201	202	203	204	205	206	207	208	209	210	211	212	213	214
215	216	217	218	219	220	221	222	223	224	225	226	227	228
229	230	231	232	233	234	235	236	237	238	239	240	241	242
243	244	245	246	247	248	249	250	251	252	253	254	255	256
257	258	259	260	261	262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279	280	281	282	283	284
285	286	287	288	289	290	291	292	293	294	295	296	296	298
299	300	301	302	303	304	305	306	307	308	309	310	311	312
313	314	315	316	317									

PLEASE PRINT Apr. H-54

This service available only to U. S. and Canadian readers

Name .....**Title**.....

Firm .....

Nature of Firm's Business .....

Street .....

City ..... **Zone**..... **State**.....

This card is void after July 1, 1954

Ad-Digest SERVICE

canvas or asbestos to strips of metal, a job that takes time and money. Today up-to-date shops are using a pre-assembled duct connection which is delivered in hundred foot coils in a handy dispenser which pulls out flat and ready to use. Coil is made of 24 gage galvanized steel fastened to your choice of fire, water and mildew-resistant canvas or to heavy, top quality asbestos. Information available. ----------Item 225

BOILERS. Page 132. A steel boiler with 7 outstanding features which, together with construction that meets or exceeds ASME code requirements, are your assurance of lasting, fine performance and lowest operating costs. Sixteen sizes from 876,000 to 10,200,000 Btu per hour. Catalog available. ----------Item 226

INSULATION. Page 5. Insulation for winter warmth and fuel conservation can also provide coolness and comfort in summer, a season which is not far off. A building really shielded from summer sun is considerably cooler not only by day but also at night. Insulation is multiple accordion aluminum, impervious to water vapor. The improved type gives protection in the entire area between joists, including the edges. Free sample available.....Item 227

POWER VENTILATORS. Page 160. Power roof ventilators with functional beauty combined with maximum operating efficiency and designed for schools, hospitals, libraries, churches and commercial buildings. Available in 31 sizes, 250 to 17,600 cfm. Information available.....Item 228

PACKAGED BOILERS. Page 63. This manufacturer has more than 20 years of pioneering and more than 12,000 individual boiler installations. These boilers deliver 80% guaranteed steam efficiency from every fuel dollar when fired with oil. They are available for oil, gas or combination oil and gas firing in sizes from 15 to 500 hp. Catalog available.....Item 229

HEATING SPECIALTIES. Page 73. Every steam heating specialty you need is in this line. Each item has design features that mean better heating performance. The radiator traps, for example, have an extra large non-clogging valve seat opening and the thermostatic disc is constructed for easy calibration when servicing in the field. There are no bellows to clog or stick. Information available. ----------Item 230

AIR FILTERS. Page 156. An air filter in which the filtering efficiency increases as the dust load is applied. One-third of the space required is saved in number of units to be installed and serviced. Cost comparison chart available. ....Item 231

AIR DIFFUSERS. Page 157. Slender, continuous line diffusers ideal for installation in shallow lighting coves or for air curtaining of glass windows or exposed wall areas. Custom built with the company's patented diffusing vanes. These diffusers fit inconspicuously into your plans. Catalog available. ----------Item 232

STEAM TRAPS. Inside front cover. Vacuum isn't vacuum to a steam trap, it's just pressure below atmospheric. The point is that steam traps for vacuum return service are not different than those on positive pressure lines. Bulletin available. ----------Item 233

DIRECT-FIRED HEATERS. Page 155. A line of direct-fired air heaters in capacities from 200,000 to 2,000,000 Btu per hour. Available in six models including vertical, horizontal and portable types. Information available. ----------Item 234

CAST IRON BOILERS. Page 67. This advertisement illustrates the durability of cast iron by showing pictures of a cast iron fence made by the advertiser in 1859 and still in use in 1954. Cast iron is an enduring material resistant to corrosive acidic gases and, in the form of a boiler, virtually indestructible. Information available. ----------Item 235

STEEL PIPE. Page 24. This pipe is recommended for conventional hot water and steam heating systems, fire control, plumbing lines, radiant heating and snow melting and will give uniform, dependable, trouble-free performance. .....Item 236

CHILLERS. Page 146. Controlled velocity chillers with improved heat transfer, no oil logging or slop over, and rapid response to thermal expansion valves. Full details and application data available. ----------Item 237

STEAM HEATING. Page 69. A high vacuum steam heating system that assures the ultimate in comfort, economy, and convenience. A single dial control tunes in with the weather, balancing heat supply against heat loss. Intended for schools, hospitals, churches, apartments, commercial and public buildings. Bulletin available. ----------Item 238

COOLING TOWERS. Page 29. This company has built a new plant with acres of production capacity to supply the demand for small capacity cooling towers—a demand which is doubled or tripled over previous periods. Information available. ----------Item 239

TANK GAGES. Page 149. Remote reading tank gages for commercial and industrial fuel oil tanks, domestic installations with buried tanks, and storage tanks for other liquids. Can be read up to one-quarter of a mile away. Bulletin available. ...Item 240

PIPE INSULATION. Page 65. An underground pipe insulation for field fabrication and by which pipes are installed, then insulated. No pipe is too large or too small to handle. Insulation is adaptable, economical, efficient, permanent and readily available. Bulletin available....Item 241

AIR CONDITIONER. Page 30. A new residential air conditioner which makes year-round home air conditioning a practical and economical reality. A complete packaged unit adaptable to any size warm air furnace without costly changes. Nine features are listed. Exclusive territories available. ----------Item 242

COAL. Page 131. How a college heating plant with a modern coal burning installation saved more than a third of its fuel bill. Modern combustion installations can add from 10 to 40% to the energy obtained from the same amount of coal in former years. Coal in most places is today's most economical fuel. ----------Item 243

GAGE. Page 155. An extremely versatile gage which serves as an air filter gage, static pressure indicator, draft gage or air velocity meter. Low priced. Bulletin available. ----------Item 244

OIL UNIT HEATER. Page 159. A suspended type direct-fired oil unit heater of 220,000 Btu per hour output and with twelve listed features. Information available. ----------Item 245

GATE VALVES. Page 56. New brass gate valves with greater strength and greater rigidity, made possible by new cylindrical upper body. Stuffing box also has been improved. Modern in appearance and available in ¼ to 3 inch sizes. Four-page folder available.....Item 246

AXIAL FLOW FANS. Page 54. How 8 axial flow fans deliver 140,000 cfm of minus 40 deg. air in a cold storage plant. Originally designed to freeze 46 tons of fruit per day, plant now handles 100 tons in a 24-hour day and has been operating with no let-up for 8 seasons.....Item 247

PNEUMATIC CONTROLS. Back cover. How the modern new plant of White Laboratories is equipped with this system of controls which automatically regulates temperatures to meet the requirements for processing pharmaceuticals and to insure worker comfort. Information available. ----------Item 248

PIPE INSULATION. Page 9. This underground pipe insulation is installed by pouring it on, tamping down, back-filling and running heat through the line; then the job is completed. It costs less per installed linear foot and delivers permanent triple-zone protection.....Item 249

DRAFT INDUCER. Page 32. Motorized chimney draft enables the boilers to operate satisfactorily and efficiently over wide ranges of weather. Suitable for use with oil, gas or coal. Bulletin available. ----------Item 250

UNIT HEATERS. Page 32. The discharge outlets of these revolving unit heaters keep the heated air in constant motion and for that reason are useful in the summer time to keep workers comfortable on hot days. Bulletin available. ....Item 251

STEAM TRAPS. Page 79. Steam traps for low, medium and high pressures with thermostatic diaphragms of a special alloy which will not soften or crack from repeated flexings and with removable thermal units which simplify cleanout and inspection. Available in a full range of sizes and capacities.....Item 252

DRAFT CONTROL. Page 148. Draft controls engineered specifically for gas-fired industrial and commercial plants and which meet the most rigid municipal requirements. Information available. ----------Item 253

AIR CONDITIONERS. Page 75. 644 of these individual room air conditioners were installed in the new 430 Park Avenue office building in New York to satisfy the demand for individual room comfort and control. Bulletin available. .....Item 254

UNIT HEATERS. Page 152. Horizontal type steam and water unit heaters with capacities up to 272,000 Btu per hour and vertical types up to 575,000 Btu per hour capacity. ----------Item 255

HEATING CONTROLS. Page 76. This type heating control was selected for a large Seattle church which has no pew over 50 feet from the altar, is radiant heated, and provides for large attendance. A weather compensated system was specified. Company has unusual engineering service. Catalog available. ----------Item 256

COPPER PIPE. Page 53. Wet air cannot rust copper control piping, an installation of which is illustrated and described. The long length light weight and elimination of many fittings by bending all make important savings in installation cost when this tubing is used. Bulletin available. ----------Item 257

STEAM HEATING SPECIALTIES. Page 59. How a Brooklyn hospital has been using this line of steam specialities since 1930 through 8 separate additions, indicating the dependability of the line. Line includes all types of valves and traps, water blenders, air eliminators, thermometers and temperature regulators.....Item 258

BLOWER VENTILATORS. Page 159. Blower ventilators of the roof type as well as wall or kitchen exhaust type. Available in three models with backwardly inclined impeller and of non-overloading characteristics. Information available. ----------Item 259

OIL AND GAS BURNERS. Page 161. Low installation and maintenance costs with

Postage Will be paid by Addressee

No Postage Stamp Necessary If Mailed in the U. S.

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 53, SEC. 34.9, P. L. & R., NEW YORK, N. Y.

HEATING AND VENTILATING

148 LAFAYETTE STREET

NEW YORK 13, N. Y.

-DIGEST SERVICE

added years of dependable service are features of this line of gas and oil burners. ----------Item 260

STEAM GENERATOR. Page 158. There are no annoying extras with this packaged boiler unit, ready to install, and which includes piping and wiring, fan, feed pump, condensate tank, blow-off valves, insulation and metal jacket.----------Item 261

TEMPERATURE REGULATORS. Page 143. Temperature regulators for accurate control of steam heated hot water tanks, vats, preheaters and process tanks. Have hydraulically-formed one-piece bellows, stainless steel valve stems and other features. ----------Item 262

GAS-OIL BURNERS. Page 153. Dual fuel burners engineered to insure peak efficiency with either gas or oil and employing forced draft for each. Nine features are listed. Literature available. ---Item 263

MOISTURE CONTROL. Page 161. You can have dry air with exact moisture control for comfort or process with this system because its cooling and heating functions are completely separate from adding or taking away moisture. Compact and inexpensive to operate and needs no summer re-heat. Bulletins available.---Item 264

FIRE PROTECTION EQUIPMENT. Page 161. A proved reliable, economical line of interior fire protection equipment. Line includes 480 cabinets alone. ----Item 265

PRESSURE TANKS. Page 77. A pressure tank for hot water systems with a vacuum breaker which enables you to drain a water-logged tank completely in a few minutes. Literature available.----Item 266

STORAGE WATER HEATERS. Page 133. A new edition of the most complete reference catalog of its kind covering all types, sizes, and styles of the company's hot water storage heater equipment. Request on your company letterhead.

COOLING TOWERS. Page 43. A line of cooling towers with Koppers pressure creosoting used on all wood employed in the construction of the towers. This preservative protects the tower against fungus and marine parasites and preserves the timber. Towers made in sizes from 2 through 100 tons. Catalogs available. ----------Item 267

DIRECT FIRED HEATERS. Page 162. Direct fired heaters give heat when and where you need it at the flick of a switch which saves on low initial cost and have fully automatic controls. Available for gas, oil, coal or dual gas and oil. Information available. ----------Item 268

AIR CLEANERS. Page 68. An industrial air cleaner of the oil bath type which is designed for handling the removal of lighter dust concentrations common to many metal-working operations. Serving as a collector or after-cleaner the equipment's triple cleaning action results in the high efficiency which permits recirculation of the cleaned air. Information available. ----------Item 269

PACKAGED AIR CONDITIONING. Page 61. This company's air-cooled packaged air conditioning already tested and proved in a wide variety of commercial installations operates entirely without water and uses only air and electricity. It costs you less to install because no plumbing is necessary and wherever installed it will cost your customers less to maintain. Line has 7 features. Franchises available.---Item 270

ELECTRIC MOTORS. Page 28. For applications requiring high starting torque this company's type RK motor is a sound choice for applications where starting loads are fairly heavy but which can be brought up to operating speed quickly. Examples are air conditioners, refrigerators, freezers, water pumps, and similar fractional or integral horsepower applications. Bulletin available.--------Item 271

ROOF VENTILATORS. Page 140. This company's line of roof ventilators is complete in regard to type and size so that the company is unbiased in the particular type of unit it recommends for a specific job. Company is prepared to modify or make special designs when required. Catalog available.----------Item 272

RELIEF VALVES. Page 31. A combined temperature and pressure relief valve combining what in the past has been two separate relief valves. The pressure relief capacities are steam rated in Btu per hour in accordance with accepted procedure. The temperature relief portion of the valve starts to open at precisely 188 degrees, opens to full capacity on a 20-degree rise, and reseats tightly when temperature drops to 183 degrees. Bulletin available.----------Item 273

PACKAGED BOILERS. Pages 22-23. Packaged boiler units in a wide range of capacities from 15 to 500 hp with complete interchangeability of fuels—light or heavy fuel oil, natural or manufactured gas or combination gas and oil. Information available.----------Item 274

DRAFT CUT-OFF. Page 27. A low draft cut-off engineered specifically to prevent explosions or damage to boiler by automatically cutting off the burner when the draft fails whether the draft is induced or natural. Control fail-safe. Information available.----------Item 275

CLEANER. Page 147. Scale, rust or algae can ruin your pressure system. This material in tablet or granular form is a powerful quick cleaner for destroying scale, rust, algae and dirt in boilers, radiators, water jackets, condensers, pipe lines and heating coils.----------Item 276

PACKAGED AIR CONDITIONING. Page 26. How just three packaged air conditioning units on each floor cool a 30-year-old building which was not designed for air conditioning. Building is the American Automobile Association's headquarters in Washington. These units have low first cost, fit every application, are capable of partial operation and have a 5-year warranty. Information available.----Item 277

VENTILATORS. Page 1. A laboratory that tests ventilating equipment is in a good position to select efficient ventilators for its own building. Texas A&M College, which tests fan capacities for power fan manufacturers, chose this line of roof ventilators for its new veterinary hospital. Capacity ratings are the output of the completely assembled unit including the head. Catalog available.----------Item 278

BASEBOARD PANELS. Page 40. Popular priced baseboard heating panels engineered especially for forced circulation hot water systems and which offer many economies in installation and operation. They reduce on-the-job costs because they come in individually cartoned 6-foot lengths so that any needed length can be quickly and conveniently cut and connected. How to sell these systems is covered in a booklet available to contractors or wholesalers.----------Item 279

EXPANSION JOINTS. Page 37. These piston ring expansion joints can be serviced and in fact unpacked and repacked under full line pressure. There is no interruption of service and no down-time for repacking because the job is done under normal working conditions. This is only one of the features of this joint. Bulletin available.----------Item 280

CONVECTORS. Page 55. When you specify or install heating equipment you'll be ahead with this line of convectors which has eleven features listed in the advertisement. Every convector is rated and approved in conformance with Commercial Standard CS140-47.----------Item 281

RELIEF VALVES. Page 164. A large installation where 10,000 gallons of domestic hot water are controlled by 4 of this company's pilot-operated temperature and pressure relief valves to prevent excessive pressure conditions and, more important, dangerous excessive temperature conditions. A combined total of more than 12,000,000 Btu per hour discharge capacity is provided. Tested capacity of the valve is 3,000,000 Btu per hour. The tank is 8 feet in diameter and 28 feet long. Information available.----------Item 282

PACKAGED BOILERS. Page 35. Every steam generator in this line is thoroughly tested before shipment. Completely assembled at the factory with burner and all boiler trim installed, it is set on a testing line, connected to service supplies, and fired. During this test period technicians check on all points of performance. Available in 18 sizes from 20 to 500 boiler hp. Catalog available.----------Item 283

PUMP FOR AIR CONDITIONING. Page 74. This company's vertical type CV pump, long a favorite in the heating field, is being specified for industrial and commercial air conditioning installations. It requires a maximum space of 15 by 15 by 22 inches and is easy to install and economical to operate. Information available. ----------Item 284

AIR DIFFUSERS. Page 47. These adjustable air diffusers are used in such nationally known department stores as The Hatch Co., Kaufmann's, Famous-Barr and Hutzler's. In restaurants, office buildings, factories, or wherever there is an air distribution problem, these diffusers can be applied. Data book available.----Item 285

MOTORS. Page 39. The red power spot on refrigeration or air conditioning equipment means that it is powered by this company's dependable motor. A booklet, Motor Showdown, a candid report on comparative results of motor performance tests is available.----------Item 286

CONVECTORS. Page 141. These convectors are easy to install and their attractive cabinet design, including safety rounded corners, is an additional feature. The best part is what's under the cabinet—all copper and aluminum heating elements for long, trouble-free operation, adjustable mountings for pitching the heating element in either direction, ample discharge grille opening for unimpeded air circulation. Bulletin available.----------Item 287

THERMOSTATIC CONTROL SYSTEM. Pages 16-17. Another MIT building is equipped with this line of pneumatic temperature controls, the new building being the John Thompson Dorrance Laboratory where research labs, animal rooms, constant temperature rooms, and classrooms require the even constant temperature assured by this control system.----Item 288

Use this Digest to locate and refer to advertisements appearing in this issue of HEATING AND VENTILATING, then fill out and mail the prepaid postcard to request further information.

Circle numbers corresponding to the advertisements in which you are interested, print your name and address clearly. Information will be sent directly from manufacturers.

PLEASE SEND US MORE INFORMATION.

Circle below item numbers on which you wish further information.

201	202	203	204	205	206	207	208	209	210	211	212	213	214
215	216	217	218	219	220	221	222	223	224	225	226	227	228
229	230	231	232	233	234	235	236	237	238	239	240	241	242
243	244	245	246	247	248	249	250	251	252	253	254	255	256
257	258	259	260	261	262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279	280	281	282	283	284
285	286	287	288	289	290	291	292	293	294	295	296	297	298
299	300	301	302	303	304	305	306	307	308	309	310	311	312
313	314	315	316	317									

PLEASE PRINT Apr. H-54

This service available only to U. S. and Canadian readers

Name ..... **Title**.....

Firm .....

Nature of Firm's Business .....

Street .....

City ..... **Zone**..... **State**.....

This card is void after July 1, 1954

Ad-Digest SERVICE

AIR CONDITIONING PUMPS. Page 25. Pre-engineered to save time, these pumps increase profits for you. The most complete line for air conditioning applications, includes packaged pumps, a close-coupled pump with either conventional packing or mechanical seal, a supporting adapter pump with flange motor and a vertical mounted pump with mechanical seal or sealless with choice of submerged or side-wall mounting. Bulletins available.
---Item 289

BOILER TUBES. Page 71. Low installation cost results when you get these welded boiler tubes which have uniform strength, wall thickness and diameter, together with high ductility and ease of rolling-in. Information available.---Item 290

COPPER TUBE. Page 11. This company is a "shirt-sleeve" outfit and wholesalers all over the country rely on the personal service by the top brass of the company as one of the reasons why they like to do business with this manufacturer. It means they can always depend on getting fast delivery of the type and size tube they want in the quantities they need...Item 291

ELECTRONIC AIR CLEANING. Pages 18-19. This company makes a line of three different type electronic precipitators. One type is a stationary plate type precipitator, another a self-cleaning electronic precipitator, and the third is a low-cost dry type electronic air filter that combines dry filtration and electronic action. Information available.---Item 292

AIR CONDITIONING. Page 52. Air conditioning will help any business, yours included, add up more profits. Whether you are a distributor or a user, this company's air conditioning line will meet your requirements completely. Packaged units in three sizes and central systems of many types. Information available.---Item 293

MOTORS. Page 160. Thousands of unit heaters, electric hoists, hydraulic pumps, exhaust fans, oil burners, and other equipment receive dependable power from this line of motors which is available in sizes from 1/30 to 5 hp. Bulletin.---Item 294

PACKAGED AIR CONDITIONERS. Page 7. Packaged air conditioners in sizes up to 20 hp, engineered for dependability and trouble-free performance. Available in sizes as low as 2 hp.---Item 295

STEEL BOILERS. Page 21. These steel boilers are rated for the nominal load and not for top capacity. Only such rated boilers gives customers the reserve which makes for greater efficiency, lower maintenance and longer useful life. 8-page catalog available.---Item 296

STEEL PIPE. Page 80. This steel pipe has 7 points of uniform goodness—uniformity in ductility, length, threading, weldability, wall thickness, strength and roundness.
---Item 297

AIR DIFFUSING PANELS. Page 48. Low velocity air diffusing ceiling panels are used in Pittsburgh's Gateway Center buildings. The panels are out of sight and installed behind the standard acoustical ceiling in all interior bays of the first three office buildings. They are draftless, give freedom in locating movable partitions, freedom in location of lighting fixtures, and the radiant panel heating and cooling effect adds to the comfort factor...Item 298

CENTRIFUGAL COMPRESSORS. Pages 12-13. This company's hermetic centrifugal compressor is now available in three new sizes for larger air conditioning jobs, water chilling capacities being up to 400 tons. Other new air conditioning equipment in new sizes and types include four new cold generator sizes, three new reciprocating compressor units, and others.
---Item 299

VIBRATION CONTROL. Page 151. These vibration isolators insure quiet operation of mechanical equipment and in addition permit installation anywhere in apartment, public and industrial buildings, decrease foundation costs, lengthen the machine life, permit higher operating speeds and reduce maintenance costs. Bulletin available.---Item 300

AMMONIA COMPRESSOR. Page 66. High operating efficiency and lighter weight make this modern unit the talk of the industry. It has the same high operating efficiency and versatility as its lower speed counterparts. Ranging in capacities from 18 to 150 tons, the new units can be used as high-stage or booster machines.
---Item 301

EXHAUST FANS. Page 150. A line of exhaust fans for acid fumes, newly designed for less weight and improved performance. For use wherever corrosive fumes exist. Bulletin available.---Item 302

COOLING TOWERS. Page 135. This company's 3-B cooling tower for use indoors or out provides the cooling efficiency you want and smooth, silent, dependable operation. Available in sizes from 1 to 108 tons. Company also makes an extra quiet unit for built-in residential air conditioning installations, designated as Model B23B. Catalogs available.---Item 303

CONDENSATE PUMPS. Page 139. Condensate pumps with low return connection, low speeds, long life, cast iron receiver, single or duplex models. A single unit easily can be converted to a duplex unit whenever load or other conditions require. Capacities are from 500 to 10,000 square feet EDR. Bulletins available.
---Item 304

GAS ANALYZER. Page 160. For combustion testing in the field, this gas analyzer, the first of its type, answers the need for an instrument husky enough for use in the boiler room and service work and yet simple, fast and accurate. Available in 1, 2 or 3 unit styles. Does a complete testing job in 3 minutes. Bulletin available.
---Item 305

OIL AND GAS FURNACES. Page 139. Oil and gas furnaces in both horizontal suspended as well as vertical units in capacities from 80,000 to 400,000 Btu per hour. Shipped completely assembled. Information available.---Item 306

WALL CLOSET CARRIERS. Page 81. This system includes everything except the pipe for installing wall-type toilets up to where the horizontal drainage line connects with the stack. The system simplifies wall-type fixture installations and usually reduces time costs for the support of all types and makes of wall-type fixtures. Bulletin available.---Item 307

AIR CONDITIONING EQUIPMENT. Page 78. A line of air conditioning equipment including spray type dehumidifiers, ceiling type air conditioning units, steam coils, cooling towers, evaporative condensers and other equipment. Provides year-round air conditioning comfort in U. S. Soldier's Home Auditorium in Washington. Designed to serve any air conditioning need. Information available.
---Item 308

PACKAGED BOILERS. Page 42. Packaged boilers available in two types, one for oil or gas firing available in capacities from 4,000 to 30,000 pounds of steam per hour for pressures up to 250 psi. The other type is designed for industrial load conditions particularly for plants with small operating and maintenance forces. Capacities from 10,000 to 60,000 pounds of steam per hour, pressures to 475 pounds per square inch. Information available.---Item 309

AIR CONDITIONING. Page 14. A system of air conditioning which employs small, space saving tubes for conditioned air branching out of each floor to individual rooms and small pipes for carrying hot water in the winter and cold in the summer; with room units under the windows where the air tube and water pipes converge; ventilation air brought into the building from outdoors at various convenient points; and the source of the comfort cooling, the company's water cooling system for location on the roof and in the basement. Information available. Item 310

MOTOR CONTROLS. Page 36. Motor controls for refrigeration and air conditioning service and including a solenoid starter and special air conditioning control unit with solenoid starter, high pressure cut-out, thermostat, and manual switch for fan operation. Information available.
---Item 311

DIFFUSERS AND GRILLE. Page 44. The Parker Pen Co.'s new plant in Wisconsin is equipped with 275 of this company's ceiling diffusers and 303 return grilles. The units harmonize gracefully with the modern surroundings and have proved records for efficient diffusion, quiet operation, adjustable deflection and volume control, and simplified servicing. Bulletin available.---Item 312

COOLING TOWERS. Page 62. Two models of cooling towers, one with capacities from 15 to 70 tons, the other in capacities from 3 to 15 tons. They feature ease of installation, top performance and durability. Information available.---Item 313

INSULATING WOOL. Page 58. This glass fiber insulating wool is so soft and compressible and lightweight it can be wrapped easily around any shape or system in hard to get to locations. It is not only a heat insulator but an excellent absorber of sound, is inorganic, resists fire and is fungus- and bacteria-proof. Folder available.---Item 314

HEATING AND AIR CONDITIONING. Page 64. A company which has the most complete line in the industry and which includes oil and gas-fired furnaces, boilers, conversion burners, and water heaters. Six features are listed.---Item 315

COPPER WATER TUBE. Page 125. Radiant panel heating fits perfectly into the growing trend to one-story school construction and the ideal material for panel heating is copper. Use of this copper water tube means easy bending and handling, its long lengths require fewer fittings, and the solder fittings used eliminate need for welding, wrench work, and thread cutting. Technical advisory service available.
---Item 316

HEATING AND VENTILATING UNITS. Page 149. These units, for floor mounting, vertical suspension, or horizontal suspension, offer the most economical method of heating and ventilating large areas in factories, warehouses, garages, hangars, commercial and industrial buildings. In three sectional types, six basic sizes each, with either right- or left-hand coil connections. Capacities from 115,000 to 2,500,000 Btu per hour. Data available...Item 317

Postage Will be paid by Addressee

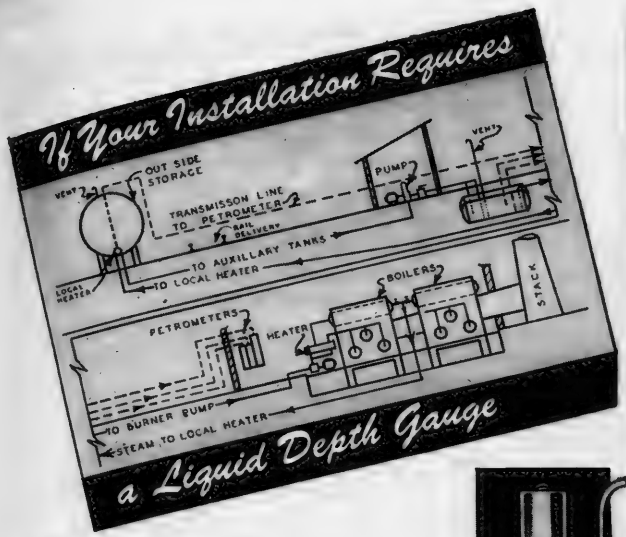
No Postage Stamp Necessary If Mailed in the U. S.

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 53, SEC. 34.9, P. L. & R., NEW YORK, N. Y.

HEATING AND VENTILATING
148 LAFAYETTE STREET
NEW YORK 13, N. Y.

AD-DIGEST SERVICE



Specify:

PETROMETER

REMOTE READING

TANK GAUGES

THE BEST GAUGE FOR:

Commercial and Industrial Fuel Oil Tanks

Domestic Installations with Buried Tanks

Storage Tanks for other liquids—gasoline, solvents, acids, etc.

Here's Why:

No troublesome moving parts—operates on the sound principle of the U-tube. Simple, dependable and accurate.

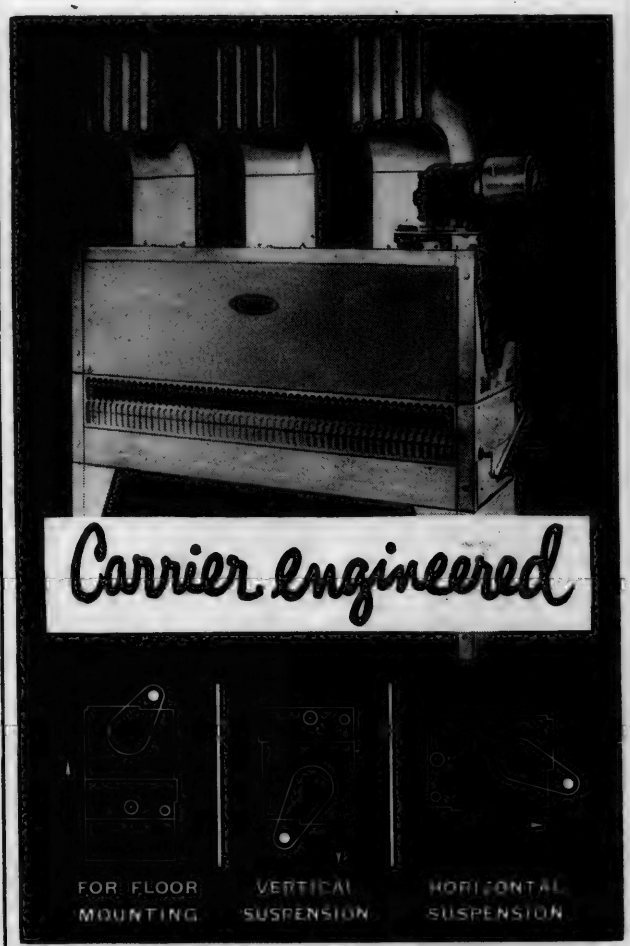
Large, easy-to-read vertical scale gives tank contents at a glance. Eliminates the cumbersome measuring stick and the inconvenience of climbing the tank.

Installation is easy—gauges can be installed on tanks above or below ground level and up to ¼ of a mile away. The tank assembly for the gauge can be installed even when the tank contains liquid. It can also be fitted in the tank separately to complete the tank work. The gauge can be connected any time later. Just tighten one simple connection and the job is finished.

FOR TANKS 20 INCHES TO 50 FEET DEEP. *Write for Bulletin PV.*

LIQUIDEPTH INDICATORS, INC.

43-22 TENTH ST., LONG ISLAND CITY 1, N. Y.



CARRIER Heating and Ventilating Units offer the most economical method of heating and ventilating large areas in factories, warehouses, garages, hangars, commercial and industrial buildings. In three sectional types—six basic sizes each, with either right or left hand coil connections—they afford a flexibility for meeting any steam or hot water installation and capacity requirement (115,000 to 2,390,000 Btu per hour). Accessories include complete line of filter boxes, intakes, diffusers and controls.

Three basic factors give these units outstanding qualities for efficiency and long life: (1) *Highly skilled engineering.* (2) *High-grade materials.* (3) *High standard manufacture.*

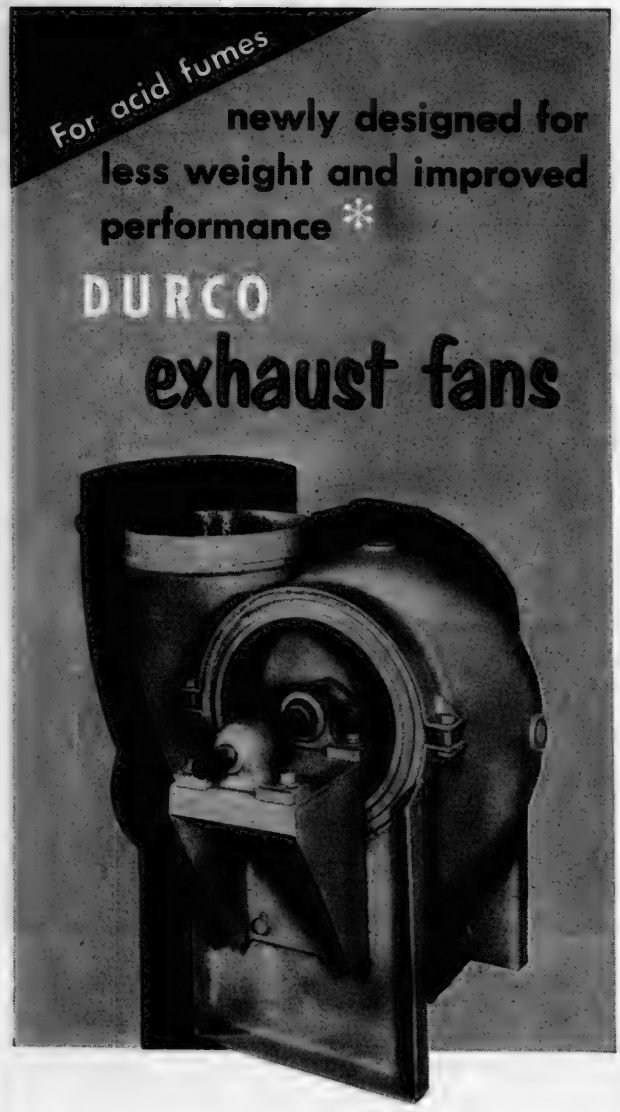
For example: All sections are die-formed from heavy-gauge steel and integrally welded. Fans are special design multi-blade, double inlet centrifugal blower type. Fan wheels are die-formed steel, electrically welded, statically and dynamically balanced. Self-aligning, dust-proof fan shaft bearings. Heating coils are copper tube with aluminum fins.

For complete list of features and selection data, WRITE to Carrier Corporation, Syracuse, New York.

Carrier also makes a complete line of Unit Heaters for steam and hot water; and Gas-fired Unit Heaters in propeller-fan and duct types.

Carrier

AIR CONDITIONING
REFRIGERATION
INDUSTRIAL HEATING



*New Durco B-series fans give unexcelled corrosion resistance. Duriron casing with a Durimet 20 multi-blade rotor resist corrosion throughout entire metal thickness.

These fans are lighter, more efficient and less expensive than any previous Durco fans. They are for use wherever corrosive fumes exist—hospitals, schools, laboratories and plants.

THE DURIRON COMPANY, INC.
DEPT. HV, DAYTON, OHIO

DURCO

Please send Bulletin on B-series Durco Fans.

Name_____

Company_____

Address_____

City_____

State_____

• John A. Gilbreath, former assistant vice president of Servel, Inc., has been named division manager of the Westinghouse Electric Corporation's new Air Conditioning Division. The Air Conditioning Division is responsible for the development, manufacture and sale of air conditioning and refrigeration equipment from two to 100 horsepower. Whereas the Air Conditioning Division formerly was a part of the Westinghouse Sturtevant Division, it now becomes a separate and distinct operating unit. The Sturtevant Division will continue to manufacture air-handling equipment of all types. Headquarters of the Air Conditioning Division will be located at Staunton, Va., site of a new Westinghouse plant scheduled for completion in June.

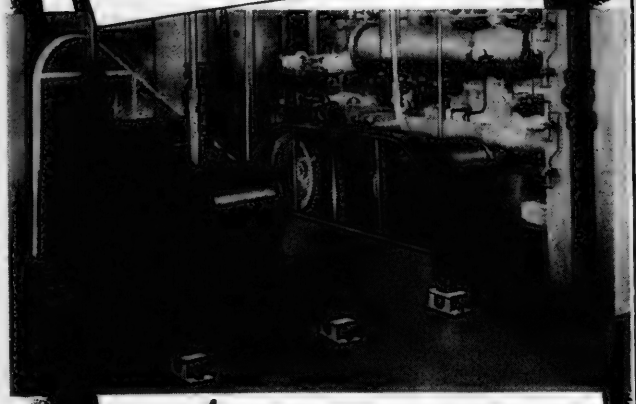
CORRECTION

Degree Days for January, 1954

Our thanks to a sharp-eyed reader who pointed out a printer's error in the degree-day table published in March. Figures for Pittsfield, Mass., were inserted, but the name of the town was not. The result was a confusing misalignment which may be straightened out by the corrected section of table below.

City	January		
	1954	1953	Normal
Moline, Illinois	1284	974	1296
Montgomery, Alabama (A)	466	427	517
Nantucket, Massachusetts (A)	1021	878	1020
Nashville, Tennessee (A)	765	609	778
New Haven, Connecticut (A)	1191	952	1113
New Orleans, Louisiana (C)	264	209	341
New York, New York (C)	1006	832	995
Newark, New Jersey	1088	876	1039
Norfolk, Virginia (C)	713	535	729
North Head, Washington (C)	(a)	551	704
North Platte, Nebraska (A)	1248	999	1271
Oak Ridge, Tennessee (C)	795	650	(a)
Oakland, California (C)	507	376	552
Oklahoma City, Oklahoma (C)	843	672	843
Omaha, Nebraska (A)	1399	1243	1302
Parkersburg, West Virginia (C)	919	778	949
Peoria, Illinois (A)	1159	1125	1240
Philadelphia, Pennsylvania (C)	971	799	933
Phoenix, Arizona (C)	388	259	425
Pittsburgh, Pennsylvania (C)	985	806	992
Pittsfield, Mass (A)	1420	1145	1358
Pocatello, Idaho (A)	1069	885	1333
Portland, Maine (A)	1454	1124	1373
Portland, Oregon (C)	758	505	791
Providence, Rhode Island (A)	1206	901	1125
Pueblo, Colorado (A)	872	780	1104
Raleigh, North Carolina (C)	685	521	691
Rapid City, South Dakota (A)	1387	1038	1361
Reading, Pennsylvania (C)	1057	857	1017
Red Bluff, California (A)	594	447	617
Reno, Nevada (A)	916	755	1048
Richmond, Virginia (C)	829	654	828
Rochester, New York (A)	1310	1058	1249
Roswell, New Mexico (A)	696	538	787
Sacramento, California (C)	529	404	614
St. Joseph, Missouri (A)	1219	1048	1017
St. Louis, Missouri (C)	957	890	983
Salt Lake City, Utah (A)	951	784	1194
San Antonio, Texas (A)	324	278	462
San Diego, California (A)	302	156	317
Sandusky, Ohio (C)	1094	972	1122
San Francisco, California (C)	412	324	462
Saulte Ste. Marie, Michigan (A)	1665	1424	1587
Savannah, Georgia (A)	370	355	424
Scranton, Pennsylvania (C)	1212	972	1141
Seattle, Washington (C)	796	545	753

STOP VIBRATION



with KORFUND VIBRATION CONTROL

IN A HOSPITAL, quiet areas must be maintained free from vibration and noise. Korfund Isolators were furnished by The Vilter Manufacturing Company for this installation of two of their Vilter Freon VMC Compressors in the new wing of the Milwaukee Hospital, Milwaukee, Wis. Although these compressors were installed close to quiet areas without special foundations, the Korfund Isolators kept vibration and noise well below the requirements.

In addition to insuring quieter operation, Korfund Vibration Control units can:

- Permit installation *anywhere* in apartment, public and industrial buildings
- Decrease original building and foundation costs
- Permit installation without reinforcing floors
- Lengthen machine life
- Permit higher operating speeds—allowing use of smaller units
- Reduce maintenance costs

We'll gladly send more information on Korfund Vibration Control for compressors, fans, pumps, boilers, air conditioners and other equipment. Write today for your free copy of Bulletin No. 7, or see our catalog in Sweet's Files.

For specific recommendations, contact us or your local Korfund office. A half-century of experience is at your disposal.

THE KORFUND CO., INC.

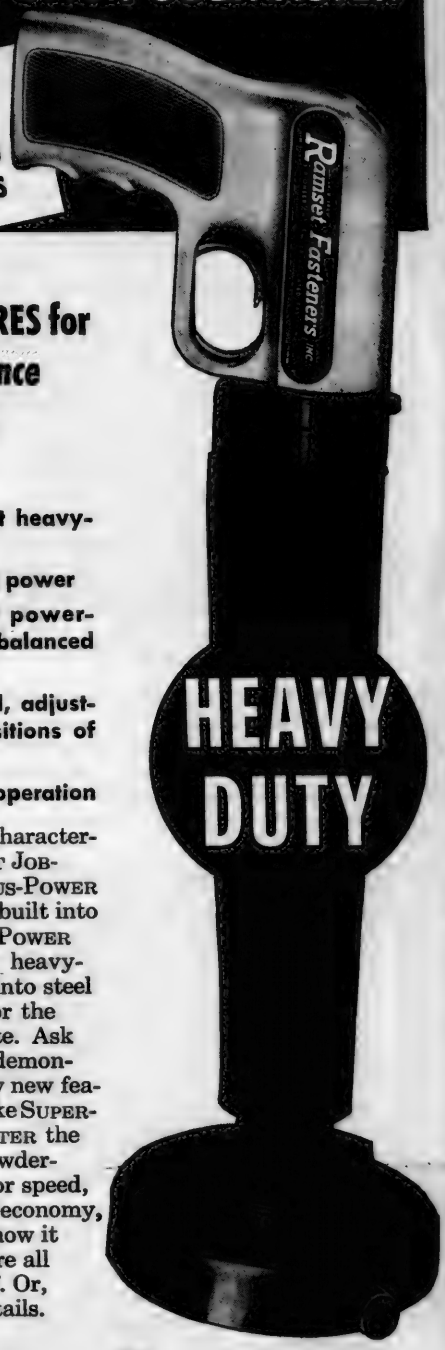
KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

48-01-E Thirty Second Place, Long Island City 1, N. Y.
In Canada: 510 Canal Bank, Ville St. Pierre, Montreal

NEW! Ramset FASTENING SYSTEM

SUPER-POWER JOBMASTER

DESIGNED ESPECIALLY FOR PLUMBING CONTRACTORS



NEW FEATURES for *Performance Economy Utility*

Shortest, lightest heavy-duty tool

Greatest driving power

New series of power-sealed charges balanced to the tool

Circle-Set Shield, adjustable for 12 positions of handle

Faster, easier operation

All the family characteristics of RAMSET JOBMASTER and PLUS-POWER JOBMASTER are built into the new SUPER-POWER JOBMASTER for heavy-duty fastening into steel up to 1" thick or the hardest concrete. Ask your dealer to demonstrate the many new features which make SUPER-POWER JOBMASTER the outstanding powder-actuated tool for speed, ease, utility and economy, and show you how it takes over where all others leave off. Or, write us for details.

Ramset Fasteners Inc.
Ramset Division, Olin Industries, Inc.
12135 BEREA RD. • CLEVELAND 11, OHIO

FIRST IN POWDER ACTUATED FASTENING — AN Olin PRODUCT

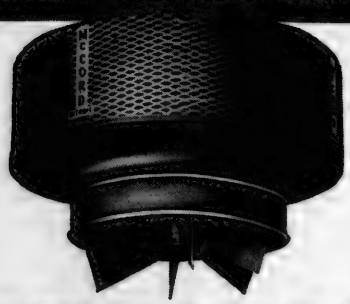
McCORD

HEATING AND AIR CONDITIONING PRODUCTS

HORIZONTAL TYPE UNIT HEATERS

Modern design—top performance—thousands in use—dependable heat. All copper coils to resist corrosion — individual tube expansion — most rugged construction — quiet operation — easy installation—standard motors with standard bases. Sizes to 272,000 B.T.U. capacity.

VERTICAL TYPE UNIT HEATERS



A proven heating unit—all copper coils to resist corrosion. McCord spiral tube fin construction creates air turbulence without undue restriction. Improved fan delivers large volume of air, with minimum air noise. All McCord heaters are guaranteed for use with 150 ibs. saturated steam pressure. Sizes to 575,000 B.T.U. capacity.

McCORD CORPORATION
DETROIT 11, MICH.

LONDON LETTER

(*Continued from page* 117)

Insulation and Condensation of Moisture in Roof

Apart from whether one warms up the air and allows it to escape, or aims to achieve a mean radiant temperature higher than that of the air, information as to the distribution of temperature in high buildings is a good guide to the economics of applying insulation to the fabric. The Building Research Station (one of the constituent laboratories of the Government Department of Scientific and Industrial Research) has investigated a hundred factory shops with heights at the eaves of the order of 15 ft. E. Danter, who took an honors degree (in physics) at Oxford a couple of years after your correspondent, and after war service spent a few years lecturing at St. Andrews before joining the B.R.S., reported the results. In the higher shops, the temperature is uniform above about 20 ft, whether unit heaters or panels are used. In unlined buildings the temperature of this upper zone is about 7 deg F higher than that at 3 ft from the floor if panels are used, 10 deg F for unit heaters. In lower buildings the roof is nearer the sources of heat, and the temperature differences can be much higher. It is concluded that the IHVE scheme of height allowances overestimates the losses for high shops, and underestimates them for low shops.

Experiments in the Controlled Weather House have confirmed these findings. This building, 18 ft by 12 ft by 12 ft, is surrounded by an outer shell for environment control. It was heated by a 16 ft long tubular heater giving temperatures of approximately 55 deg F in its immediate neighborhood. The results obtained are shown in Fig. 4, the heat input being constant for all tests. It is clear that to obtain the same average temperature with the steeper temperature gradients from floor to ceiling the heat input would have to be increased, to make up for the additional losses through the ceiling.

The paper on Factory Insulation by A. H. T. Broderick, Chairman of the Structural Insulation Association, contains a table of the properties (weight per cubic feet and thermal conductivity) of about 30 different forms of structural insulation. There is a second table giving *U* values for various types of roof and wall construction, differently insulated. In view of the author's standing, these are probably the most up-to-date and reliable figures currently available. In the discussion reference was made to the difficulty of persuading management that insulation was worth while. Some years ago the author had assisted the Ministry of Fuel & Power in the production of a booklet "which brought the subject down to the mental level of managing directors."

EXPERIENCE IS MY CLASSROOM

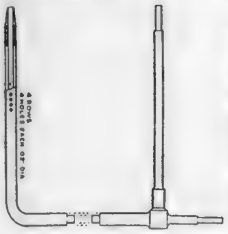
(*Concluded from page* 118)

depreciation, obsolescence, maintenance, painting, replacement and spare parts are all lessened. Water hammer is reduced (particularly during pick-up) except for very small pipes, due to less condensation, therefore steam will be drier and have less flash. Traps are reduced in number and capacity. Few stop to think of all these things, which is an appreciable factor on sizeable jobs.

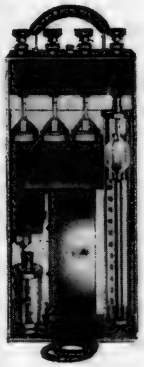
Rule Out Guesswork!

Portable and stationary Inclined and Vertical Draft Gages. Level and tube replaceable in field. Constant zero. Bulletin 109.

Air Filter Gages for measuring resistance in air conditioning ducts. Bulletin 114.



Be Sure with ELLISON Instruments



Pitot Tubes for air and gas flow measurements. Angle and straight stem types, brass for temperatures to 500°F., stainless steel for temperatures to 1000°F. Bulletin 109.

PORTABLE GAS ANALYZERS Accurate, easy to use Combustion Testing Set equipped for analysis of CO_2, O_2 and CO, complete with flue gas thermometer. Bulletin 120.

ELLISON DRAFT GAGE CO.

542 W. MONROE ST. Since 1896 CHICAGO 6, ILL.

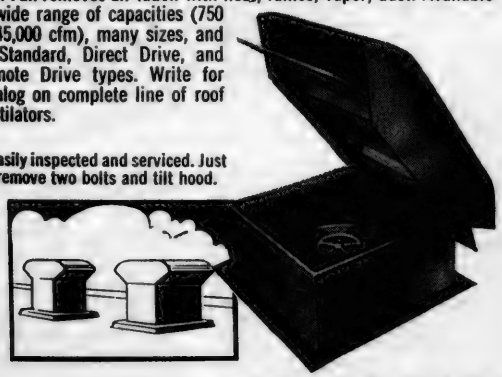
THE ELLISON LINE ALSO INCLUDES:

Dial Draft Gages—Bell Type - Inclined Draft Gages—Portable Inclined Vertical Tube Gages - Vertical Tube Gages—Oil, Heavy Liquid and Mercury—Single and Multi-Tube - Saturator Gages U Gages—Stationary and Portable - Air Filter Gages—Dial and Inclined Tube Types - Pitot Tubes - U Path Steam Calorimeters Portable Gas Analyzers—Orsat Type

Architecturally Right for Any Building

Allen High-Efficiency ROOF FAN

Here's why the Allen-engineered, power-driven Roof Fan is specified consistently for various commercial and industrial buildings: it is low in initial cost; it is easy to install; and because of its lower overall height, this fan fits smoothly onto any rooftop, without disrupting the architectural lines of the building. This rugged, High-Efficiency Roof Fan removes air laden with heat, fumes, vapor, dust. Available in wide range of capacities (750 to 45,000 cfm), many sizes, and in Standard, Direct Drive, and Remote Drive types. Write for catalog on complete line of roof ventilators.



Easily inspected and serviced. Just remove two bolts and tilt hood.

Representatives in principal cities are listed in our catalog in Sweet's Architectural File, Section 20b.

ALLEN ENGINEERED VENTILATION

PRODUCTION PLANNING CO.
ROCHESTER, MICHIGAN

Roof Ventilators for Every Commercial and Industrial Need

Now! A DUAL FUEL BURNER

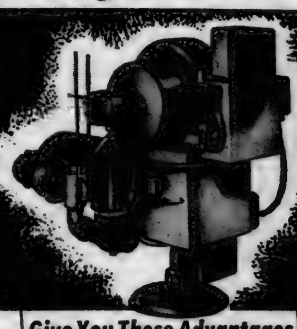
Engineered To Insure Peak Efficiency With Both Fuels

GAS and OIL

Siemon Power Combi-Matic Burner
employs the forced-draft principle for firing on both gas and oil.

SIEMON Bonus Built* Burners

offer more to you . . . more to your customers.



*Bonus Built Features...	Give You These Advantages
Factory Assembled	Less installation time required.
Factory Tested—for Both Gas and Oil	Insures top "on the job" performance.
Automatic Air Adjustment	Just set it . . . forget it . . .
Motorized Gas Valve	Quiet start-ups; actuates air dampers to correct position.
Automatic Ignition Transformer	Automatic ignition for BOTH fuels.
Uses Standard Controls	Parts always accessible immediately.
Electronic safeguard	Immediate response to flame interruption.
Pressure Safety Control	Prevents opening of either fuel valve unless fan is running and pump pressure proven.
Optional Automatic or Manual Changeover	Will switch automatically from outside temperature or by the flip of a switch.

Model FGO-2200-E
Boiler fired at 2,000,000 B.T.U. input—gas and oil installation in a large Midwestern paper distributing plant

Siemon Power Combi-Matic DUAL FUEL BURNERS

Siemon Manufacturing Co.
1819 Holmes, Dept. R. Kansas City, Mo.
Please rush literature and "profit plan" details about your Forced Draft Dual Fuel Burner.

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

Residential
AIR
CONDITIONING
Without Water!

UNICON
by KRAMER

A Remote Type Air-Cooled Condenser that completely eliminates water, sewerage and plumbing problems.

SPECIFICALLY DESIGNED FOR RESIDENTIAL APPLICATION

Unusually Quiet!

WRITE FOR BULLETIN No. U 250

KRAMER TRENTON CO.
Trenton 5, N.J.

● William B. Firman has been appointed manager of domestic sales of Powermaster packaged automatic boilers for Orr & Sembower, Inc., Reading, Pa. Mr. Firman joined the company in 1947 as a salesman.

WHAT READERS SAY

Air-Cooled vs. Water-Cooled Costs

EDITOR, HEATING AND VENTILATING,

Your writer covering the recent Washington ASRE meeting did an excellent job; however, in discussing (on page 89, January issue) J. D. Loveley's speech, he summarized just a fraction too much.

The conclusion of the article reads "Based on 2 cents per kwh for power, the cost for operating a water cooled unit is below $80 and the cost of water is almost $40 per season. The cost of operating an air cooled unit is $95."

Those of us familiar with the figures know that the water cost of $40 must be added to the operating figure of $80—total approximately $120. There are others, however, who when reading the article have been given the impression that the $40 should be considered part of the $80, deducing, therefore, that air-cooled at $95 costs more to operate than water cooled equipment.

In citing the $80 figure Mr. Loveley stated that "then must be added the water costs at almost $40 per season. . . ."

It's a question of ambiguity, of course. . .

Dayton, Ohio. *J. L. McGarry*

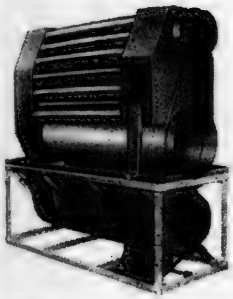
Canadian Degree-Days for February, 1954

City	February		Cumulative	
	1954	Normal	1954	Normal
Calgary, Alta.	990	1355	7165	6666
Charlottetown, P.E.I.	1084	1338	5034	5666
Crescent Valley, B. C.	888	1112	5215	5743
Edmonton, Alta	1198	1501	6741	7299
Fort William, Ont.	1263	1582	6869	7204
Grande Prairie, Alta.	1355	1456	7545	7456
Halifax, N. S.	924	1170	4257	5068
London, Ont.	1064	1240	4827	5253
Medicine Hat, Alta.	1221	1406	5804	6438
Moncton, N. B.	1065	1392	5291	6106
Montreal, P. Q.	1180	1460	5465	6108
North Bay, Ont.	1218	1492	6284	6653
Ottawa, Ont.	1194	1459	5692	6382
Penticton, B. C.	776	969	4373	4779
Porquis Junction, Ont.	1400	1764	7392	8064
Prince George, B. C.	1103	1305	6302	6677
Quebec City, P. Q.	1187	1481	5864	6688
Regina, Sask.	1116	1764	6856	8137
St. John, N. B.	1086	1266	5158	5652
Saskatoon, Sask.	1224	1635	7096	7911
Toronto, Ont.	910	1206	4382	5154
Vancouver, B. C.	673	736	3564	3797
Victoria, B. C.	637	689	3348	3414
Windsor, Ont.	907	1148	4217	4877
Winnipeg, Man.	1248	1775	7013	8091

*These data are supplied through the courtesy of the Meteorological Division, Air Service Branch, Department of Transport, Canada.

The department reports slight revisions in the figures for January, as published in last month's issue. Corrected figures are: Medicine Hat, Alta., 2080; Prince George, B. C., 1962.

the "heart" of
NATIONAL CHAMPIONS
wring more heat from your fuel dollar

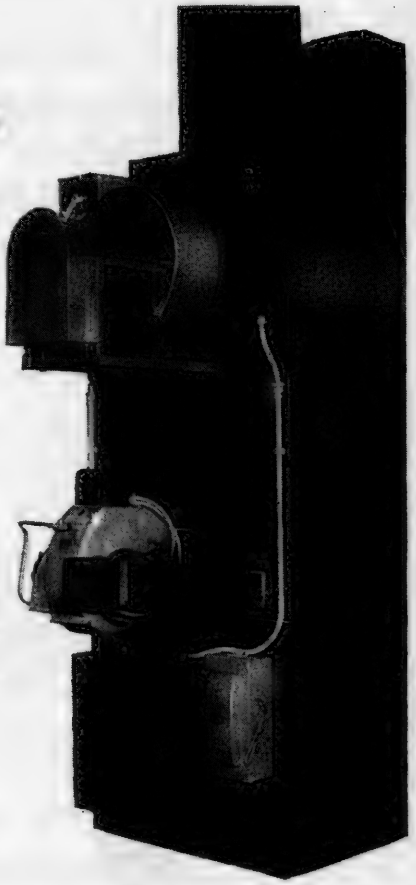


Stainless steel, teardrop design firebox unit—the "heart" of National Champions.

Year after year National Champion direct fired heaters wring more heat from fuel dollars. How? Chiefly with the stainless steel "heart" in all National Champions. Easy to wipe teardrop design allows a constant, uniform flow of clean air over the heating unit. Designed for light oil, heavy oil, gas or gas-oil firing, National Champions are completely automatic to maintain 80% efficiency. Easy to service—no refractory materials or combustion chamber maintenance. Welded into a long-lasting, one-piece unit with straight economizer tubes.

NATIONAL CHAMPION HEATERS
200,000 to 2,000,000 BTU
For large space heating, make-up air, drying, curing and de-icing.

Model H—vertical unit with discharge heads. 12 sizes.
Model D—vertical unit for duct work. 12 sizes.
Model P—portable, vertical unit for flexible duty. 6 sizes.
Model R—inverted unit with discharge heads at bottom. 12 sizes.
Model S—vertical unit with side blowers to permit location of air mixing dampers. 12 sizes.
Model C—horizontal ceiling suspension unit for space saving. 12 sizes.



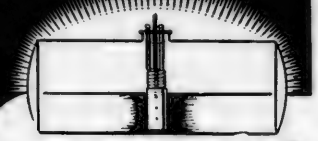
Completely wired, assembled and carefully fire tested to assure peak performance after installation. Listed by Underwriters' Laboratories, Inc.

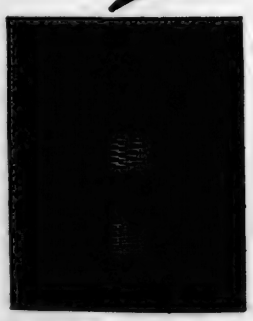
Write today for complete information and specifications.

NATIONAL HEATER COMPANY, INC.
2182 Cleora Avenue, St. Paul 4, Minnesota.

Solve STORAGE TANK OIL PREHEATING

REMPE
"Hot Spot"
PREHEATER





All-steel shell and coil assembly for preheating No. 5 and Bunker "C" oils and other liquids to proper flow temperature before they enter the suction pipe. Positive preheating by flow accumulator.

Suction pipe, inlet and outlet pipes for heating by steam or hot water go through manhole cover. Made with 14" or 16" dia. shell.

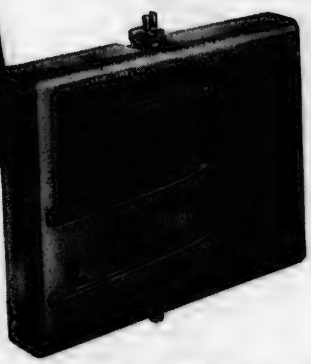
WRITE FOR DETAILS

Complete facilities for fabrication of pipe coils — all types — all materials. Engineering service. Send details for price.

HEAT TRANSFER EQUIPMENT REMPE CO. Founded 1890

REMPE COMPANY
358 N. Sacramento Blvd., Chicago 12, Ill.

NEW
DWYER FLEX-TUBE
1-V GAGE



Extremely Versatile — serves as air filter gage, static pressure indicator, draft gage, air velocity meter, etc.

Check these points:—

- Low range accuracy .01" water
- Ranges 0-3" and 0-7" water
- Attractive, rugged molded plastic housing
- Plus, minus or differential readings
- Plunger type oil level adjuster
- Furnished complete — tubing and fittings
- Direct-reading velocity models available
- Low priced

Ask for Bulletin 206

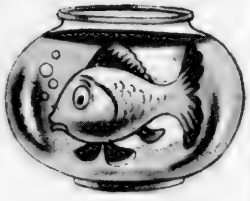
DWYER *Specialized* INSTRUMENTS and GAGES

F. W. DWYER MFG. CO. • 309 So. Western Ave. • Chicago 12, Ill.

If you're fishing for higher filtering efficiency, AGITAIR FM AIR FILTERS are your best catch!

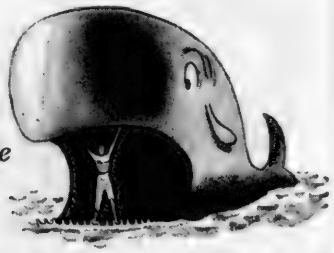
High velocity ...highest efficiency.

One-third less space required



Cuts installation and maintenance costs

Larger capacity ...longer life



Designed for an approach velocity of 530 fpm over the net media area, the high filtering efficiency of the AGITAIR FM increases as the dust load is applied. You save ⅓ in space required, in number of units to be installed and serviced. Very large dust-holding capacity of AGITAIR FM assures longer service periods, fewer cleanings per year, lower service charges. No exposed wire ends to cut or damage hands of service operators. Compare.

Send today for free Cost Comparison Chart.

AIR DEVICES INC.
185 Madison Avenue, New York 16, N. Y.

FILTERS • AIR DIFFUSERS • EXHAUSTERS

DEGREE-DAYS FOR FEBRUARY, 1954

(A) Airport readings; (C) city office readings; (O) Readings at a point on outskirts of city.

For correction of January degree-day figures, see page 150.

City	February		
	1954	1953	Normal
Abilene, Texas (A)	260	435	479
Albany, New York (A)	935	1005	1179
Albuquerque, New Mexico (A)	503	732	714
Alpena, Michigan (C)	1000	1111	1263
Anaconda, Montana (C)	844	1035	1164*
Asheville, North Carolina (C)	586	631	678
Atlanta, Georgia (C)	409	485	512
Atlantic City, New Jersey (C)	674	684	829
Augusta, Georgia (A)	354	407	412
Baltimore, Maryland (C)	565	636	776
Billings, Montana (A)	684	906	1089
Binghamton, New York (C)	842	898	1100
Birmingham, Alabama (A)	381	441	491
Bismarck, North Dakota (A)	866	1193	1464
Block Island, Rhode Island (A)	781	796	955
Boise, Idaho (A)	727	796	868
Boston, Massachusetts (A)	792	834	1002
Bozeman, Montana (C)	848	1049	1208*
Buffalo, New York (A)	886	956	1128*
Burlington, Iowa (A)	759	895	1036
Burlington, Vermont (A)	1058	1099	1313
Butte, Montana (C)	903	1073	1143*
Cairo Illinois (C)	495	593	683
Charleston, South Carolina (C)	256	290	363
Charlotte, North Carolina (C)	462	497	577
Chattanooga, Tennessee (A)	463	538	588
Cheyenne, Wyoming (A)	724	1042	1044
Chicago, Illinois (C)	751	894	1039*
Cincinnati, Ohio (C)	573	660	812
Cleveland, Ohio (A)	796	874	1019
Columbia, Missouri (A)	617	705	876
Columbia, South Carolina (C)	317	381	443
Columbus, Ohio (C)	650	809	907
Concord, New Hampshire (A)	985	1040	1226
Concordia, Kansas (C)	562	731	899
Dallas, Texas (A)	232	406	432
Dayton, Ohio (A)	730	841	941
Deer Lodge, Montana (C)	865	963	1175*
Denver, Colorado (C)	589	897	924
Des Moines, Iowa (A)	759	985	1092
Detroit, Michigan (A)	876	913	1072
Devils Lake, North Dakota (C)	1091	1360	1576
Dodge City, Kansas (A)	535	725	840
Dubuque, Iowa (C)	871	1100	1187
Duluth, Minnesota (C)	1107	1438	1448
Eastport, Maine (A)	(a)	1045	1201
Elkins, West Virginia (A)	799	853	910
El Paso, Texas (A)	338	468	445
Ely, Nevada (A)	854	954	1033
Erie, Pennsylvania (C)	(a)	857	1039
Escanaba, Michigan (C)	1040	1239	1327
Evansville, Indiana (A)	571	682	770
Fargo, North Dakota (A)	1075	1360	1518
Fort Smith, Arkansas (A)	419	554	571
Fort Wayne, Indiana (A)	796	919	1036
Fort Worth, Texas (A)	247	394	446
Fresno, California (A)	422	459	389
Galveston, Texas (C)	115	253	247
Grand Junction, Colorado (A)	674	887	924
Grand Rapids, Michigan (A)	898	983	1154
Green Bay, Wisconsin (C)	1040	1290	1336
Greensboro, North Carolina (A)	544	574	672
Greenville, South Carolina (A)	439	499	552
Harrisburg, Pennsylvania (A)	710	754	921
Hartford, Connecticut (A)	803	850	1050
Hatteras, North Carolina (C)	396	408	487
Havre, Montana (C)	774	1011	1291
Helena, Montana (A)	842	979	1165
Houston, Texas (C)	109	252	240
Huron, South Dakota (A)	819	1222	1327
Indianapolis, Indiana (A)	695	815	938
Jackson, Mississippi (A)	286	391	405
Kansas City, Missouri (A)	541	685	851
Knoxville, Tennessee (A)	497	560	630
La Crosse, Wisconsin (A)	896	1239	1280
Lander, Wyoming (A)	797	1135	1179
Lansing, Michigan (A)	937	987	1142
Lewiston, Maine (O)	1013	1021	1243*
Lincoln, Nebraska (C)	637	839	1000
Little Rock, Arkansas (A)	372	508	543

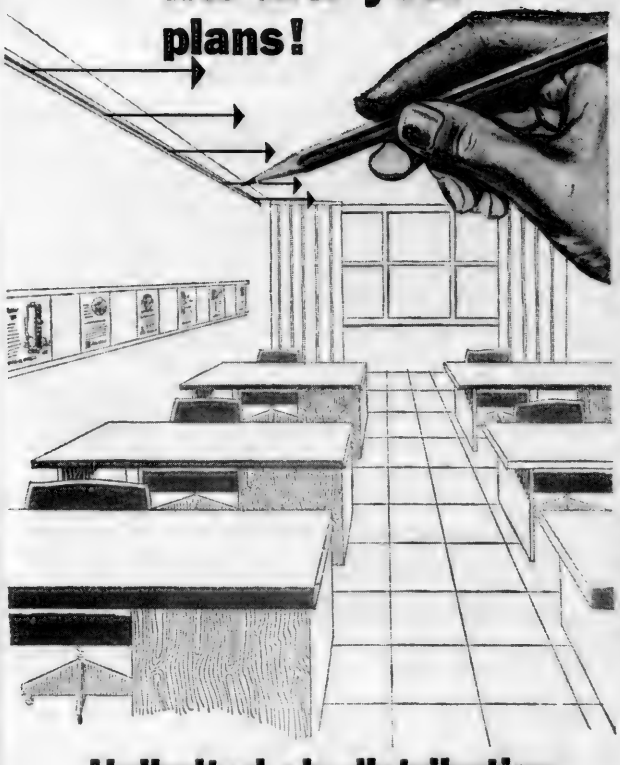
City	February		
	1954	1953	Normal
Livingston, Montana (C)	738	951	1067*
Los Angeles, California (C)	98	180	244
Louisville, Kentucky (A)	567	661	778
Lynchburg, Virginia (A)	588	635	722
Macon, Georgia (A)	299	386	391
Madison, Wisconsin (C)	895	1115	1207
Marquette, Michigan (C)	1005	1214	1291
Memphis, Tennessee (A)	399	506	574
Meridian, Mississippi (A)	310	410	413
Milwaukee, Wisconsin (A)	887	1043	1142
Minneapolis, Minnesota (A)	924	1313	1310
Moline, Illinois (A)	796	974	1075
Montgomery, Alabama (A)	296	374	388
Nantucket, Massachusetts (A)	829	819	949
Nashville, Tennessee (A)	491	583	636
New Haven, Connecticut (A)	785	824	1005
New Orleans, Louisiana (C)	117	222	223
New York, New York (C)	688	755	904
Newark, New Jersey (A)	707	763	932
Norfolk, Virginia (C)	508	481	644
North Head, Washington (C)	(a)	561	585
North Platte, Nebraska (A)	685	984	1016
Oak Ridge, Tennesee (C)	524	613	(a)
Oakland, California (C)	367	391	400
Oklahoma City, Oklahoma (C)	359	559	630
Omaha, Nebraska (A)	667	921	1058
Parkersburg, West Virginia (C)	625	721	826
Peoria, Illinois (A)	766	896	1028
Philadelphia, Pennsylvania (C)	625	693	837
Phoenix, Arizona (C)	114	267	275
Pittsburgh, Pennsylvania (C)	685	752	879
Pittsfield, Massachusetts (A)	991	1059	1212
Pocatello, Idaho (A)	828	879	1022
Portland, Maine (A)	998	1041	1218
Portland, Oregon (C)	558	544	594
Providence, Rhode Island (A)	825	801	1019
Pueblo, Colorado (A)	584	847	865
Raleigh, North Carolina (C)	466	503	577
Rapid City, South Dakota (A)	661	1095	1151
Reading, Pennsylvania (C)	685	734	902
Red Bluff, California (A)	368	379	423
Reno, Nevada (A)	(a)	819	804
Richmond, Virginia (C)	556	561	708
Rochester, New York (A)	913	968	1148
Roswell, New Mexico (A)	407	617	566
Sacramento, California (C)	421	367	403
St. Joseph, Missouri (A)	630	766	820
St. Louis, Missouri (C)	559	652	792
Salt Lake City, Utah (A)	793	779	885
San Antonio, Texas (A)	142	297	293
San Diego, California (A)	124	223	247
Sandusky, Ohio (C)	779	855	997
San Francisco, California (C)	302	300	336
Sault Ste. Marie, Michigan (A)	1130	1270	1442
Savannah, Georgia (A)	268	300	330
Scranton, Pennsylvania (C)	793	864	1028
Seattle, Washington (C)	630	576	602
Sheridan, Wyoming (A)	731	1020	1170
Shreveport, Louisiana (A)	240	394	386
Sioux City, Iowa (A)	756	1105	1170
Spokane, Washington (A)	886	834	988
Springfield, Illinois (C)	656	775	907
Springfield, Missouri (A)	584	675	790
Syracuse, New York (A)	893	988	1117
Tacoma, Washington (C)	(a)	610	636
Terre Haute, Indiana (A)	668	792	913
Toledo, Ohio (A)	822	921	1056
Topeka, Kansas (C)	537	685	851
Trenton, New Jersey (C)	674	741	904
Tulsa, Oklahoma (A)	391	546	644
Utica, New York (O)	950	1042	1181*
Valentine, Nebraska (C)	670	1090	1100
Walla Walla, Washington (C)	662	598	748
Washington, D. C. (C)	583	617	770
Wichita, Kansas (A)	531	670	778
Williston, North Dakota (C)	896	1210	1442
Winnemucca, Nevada (C)	741	861	854
Yakima, Washington (A)	809	698	862

(a) Data not available.

*Same normal figures as previously listed by HEATING AND VENTILATING since new figures are not available. All other normal figures in this table are based on a 30-year period covering 1921 to 1950, inclusive, recently compiled and published by the U. S. Weather Bureau.

Figures in this table, with seven exceptions, based on local weather bureau reports. Exceptions are Utica and Lewiston, figures for which are furnished through the courtesy of Coke Sales Department, Central New York Power Corp., Utica, N. Y.; and Norman E. Ross, Bursar, Bates College, Lewiston, Me., respectively; Anaconda, Bozeman, Butte, Deer Lodge and Livingston, Mont., through the courtesy of the Montana Power Company.

See how inconspicuously STRIPLINE fits into your plans!



Unlimited air distribution provided by slender continuous diffusers ...another AGITAIR first!

Stripline diffusers offer complete application versatility. They are ideal for installation in shallow lighting coves...window stools for air curtaining of glass windows or exposed wall areas...side of furred beams... or as a decorative border blanketing the entire area with noiseless, draftless air distribution. Custom built with AGITAIR's patented diffusing vanes, Stripline diffusers create maximum mixing and aspiration... quick temperature equalization and correct air distribution over any desired length.

Write for your free copy of Catalog S-100 today.

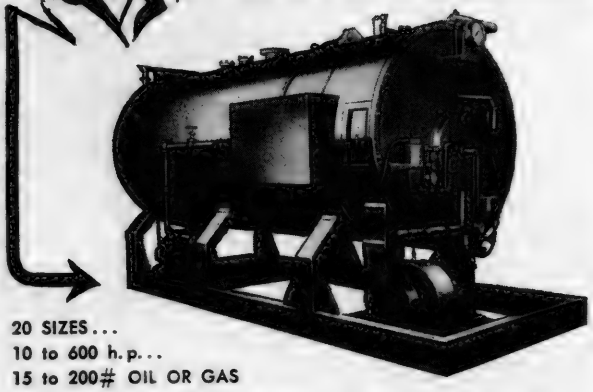
AGITAIR STRIPLINE

AIR DEVICES INC.

185 Madison Avenue, New York 16, N. Y.

AIR DIFFUSERS • FILTERS • EXHAUSTERS

No Annoying "Extras"
IT'S READY TO INSTALL
AND START MAKING
Low-Cost Steam!



20 SIZES...
10 to 600 h.p...
15 to 200# OIL OR GAS

AMESTEAM GENERATOR

This automatically controlled packaged boiler unit includes:

★ all piping and wiring, ready for your service connections.

★ fan, feed water pump, condensate tank, injector, blow-off valve, necessary refractories, insulation and metal jacket.

ALL YOU NEED is fuel tank, gas vent and service connections.

—AND YOU KEEP RIGHT ON SAVING

with these trouble-free, fully automatic units with their eye-level controls, their accessibility inside and out, and fuel-saving 80% guaranteed efficiency!

FOR FACTS ON LOWER COST STEAM
WRITE FOR THIS FREE BULLETIN NOW!

NAME.....
COMPANY.....
ADDRESS.....
.....

AMES IRON WORKS

BOX BOX C-44 OSWEGO, N. Y.

Builders of Better Boilers Since 1848

COMING EVENTS

Where listed, names or titles of individuals are those from whom further information is available.

INDUSTRIAL HEALTH CONFERENCE—Annual meeting of five groups, including the American Industrial Hygiene Association, at the Hotel Sherman, Chicago, Ill. Publicity Committee, 205 N. LaSalle St., Chicago 1, Ill...**APRIL 26-30, 1954**

AIR POLLUTION MEETING—Annual meeting of the Air Pollution Control Association, at the Patten Hotel, Chattanooga, Tenn. Robert T. Griebling, executive secretary of the Association 4400 Fifth Ave., Pittsburgh 13, Pa...**MAY 3-5, 1954**

WELDING SOCIETY MEETING—1954 National spring technical meeting of the American Welding Society, at the Hotel Statler, Buffalo, N. Y. J. G. McGrath, national secretary of the Society, 33 W. 39th St., New York 18, N. Y. .....**MAY 4-7, 1954.**

WELDING SOCIETY EXPOSITION—1954 Welding and Allied Industry Exposition of the American Welding Society, at the Buffalo Memorial Auditorium, Buffalo, N. Y. J. G. McGrath, national secretary of the Society, 33 W. 39th St., New York 18, N. Y. .....**MAY 5-8, 1954.**

INDOOR COMFORT EXPOSITION—The National Indoor Comfort Exposition, at the Commercial Museum, Philadelphia, Pa., in conjunction with the 32nd Convention of the Oil-Heat Institute of America, Inc. R. H. L. Becker, secretary of the Institute, 500 Fifth Ave., New York 36, N. Y. .....**MAY 16-20, 1954.**

GAS APPLIANCE MEETING—Annual meeting of the Gas Appliance Manufacturers Association, at The Drake Hotel, Chicago, Ill. H. Leigh Whitelaw, managing director of the Association, 60 E. 42nd St., New York, N. Y. .....**MAY 19-21, 1954.**

STEEL BOILER MEETING—Annual meeting of the Steel Boiler Institute, at The Traymore Hotel, Atlantic City, N. J. Secretary of the Institute, Land Title Building, Philadelphia 10, Pa. .....**MAY 24-25, 1954.**

HEATING AND PIPING CONTRACTORS CONVENTION—65th annual convention of the Heating, Piping and Air Conditioning Contractors National Association, at the Hotel Traymore, Atlantic City, N. J. Lloyd B. Gruman, Jr., acting secretary of the Association, 1250 Avenue of the Americas, New York 20, N. Y.....**MAY 24-28, 1954.**

NDHA CONVENTION—Annual convention of the National District Heating Association, at The Greenbrier, White Sulphur Springs, West Va. John F. Collins, Jr., secretary of the Association, 827 N. West Euclid Ave., Pittsburgh 6, Pa. .....**MAY 25-28, 1954.**

IBR MEETING—Meeting of the Institute of Boiler & Radiator Manufacturers, at Seaview Country Club, Absecon, N. J. Secretary of the Institute, 60 E. 42nd St., New York, N. Y. .....**JUNE 2-4, 1954.**

AUTOMOTIVE ENGINEERS MEETING—Summer meeting of the Society of Automotive Engineers, at the Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J. Secretary of the Society, 29 W. 39th St., New York 18, N. Y...**JUNE 6-11, 1954.**

TESTING MATERIALS MEETING—Annual meeting and exhibition of the American Society for Testing Materials, at the Sherman Hotel, Chicago, Ill. Secretary of the Society, 1916 Race St., Philadelphia 3, Pa.....**JUNE 13-18, 1954.**

PLANT MAINTENANCE SHOW—Western Plant Maintenance Show at the Pan Pacific Auditorium, Los Angeles, Calif. Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y. .....**JULY, 13-15, 1954**

INTERNATIONAL INSTRUMENT CONGRESS—First International Instrument Congress and Exposition, sponsored by The Instrument Society of America, to be held in the Commercial Museum and Convention Hall, Philadelphia, Pa. Richard Rimbach, managing director of the Exposition, 845 Ridge Ave., Pittsburgh 12, Pa.....**SEPTEMBER 13-25, 1954.**

POWER SHOW—21st National Exposition of Power and Mechanical Engineering, at the Comercial Museum, Philadelphia, Pa., to be held under the auspices of The American Society of Mechanical Engineers. Charles F. Roth, manager of the Exposition, 480 Lexington Ave., New York 17, N. Y. .....**DECEMBER 2-7, 1954.**

HEATING & VENTILATING EXPOSITION—12th International Heating & Ventilating Exposition, at the Commercial Museum and Convention Hall, Philadelphia, Pa., held under the auspices of the American Society of Heating and Ventilating Engineers. Charles F. Roth, manager of the Exposition, 480 Lexington Ave., New York 17, N. Y. .....**JANUARY 24-28, 1955.**

New COOK Blower Ventilators

Backwardly-inclined impeller, non-overloading

WALL or KITCHEN EXHAUST — complete assembly is easily adjustable to wall thickness. In 7", 9" and 10" sizes. Model W.

ROOF VENTILATOR, Model BV, direct drive, 9" to 21", 400 to 5000 cfm.

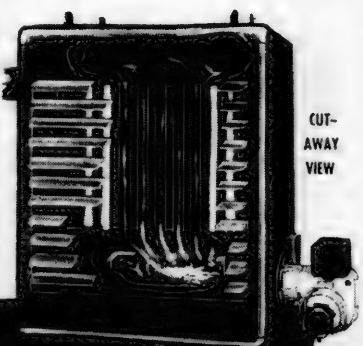
ROOF VENTILATOR in 7", 9" and 10" sizes. Base fits 6" and 8" pipe. Handsome interior grille with this and above model. Model R.

COOK

Duct Fan | Exhaust Fan | Man Cooler | Roof Ventilator

Write for Catalog BV, Dept. HV, Loren Cook Co., Berea, Ohio.

WHAT MAKES Delta's NEW DIRECT FIRED OIL UNIT HEATER SO SUPERIOR?



1. GUN-TYPE BURNER!
2. 220,000 BTU HR. OUTPUT!
3. ADJUSTABLE LOUVRES!
4. 5,730 CFM AIR DELIVERY!
5. VERTICAL FLUE TRAVEL!
6. SELF POSITIONING BURNER MOUNT!
7. SUMMER AIR CIRCULATION!
8. AUTOMATIC HUMIDIFIER!
9. LOW OPERATING COSTS!
10. FACTORY WIRING & ASSEMBLY!
11. RUGGED CONSTRUCTION!
12. 59 COMMERCIAL APPLICATIONS!

NEVER BEFORE A UNIT LIKE THIS! NEVER BEFORE A DEMAND LIKE THIS!

To efficiently heat offices and closed partitioned areas, see the DELTA line of SUSPENDED-HORIZONTAL FURNACES.

SEE OUR ENTIRE LINE AT THE NATIONAL INDOOR COMFORT EXPOSITION — BOOTHS 151-153

DELTA HEATING CORPORATION, TRENTON 8, NEW JERSEY

In Canada — Kresno-Stamm • Montreal 24, Canada

You'll save up to 50 per cent with the new SILENT DUCT

TRADE MARK

Pre-assembled metal and material pulls out flat and ready to use

LET'S PUT IT THIS WAY...you need some flexible duct connections. As the first step, you attach canvas or asbestos to strips of metal...a job that takes time and costs money. In shop after shop 50% to 60% is being *saved* today by using *Elgen Silent Duct*, the new connection material that comes to you pre-assembled for immediate fabrication.

Elgen Silent Duct is delivered in 100-foot (approx.) coils in a handy dispenser...*pulls out absolutely flat* and ready to use. It is made of 24-gauge galvanized steel, fastened to your choice of fire, water and mildew-resistant canvas (Govt. Spec. MIL-D-10860) or to heavy, top quality asbestos.

Order *Elgen Silent Duct* from your jobber and make savings that really help you get business. If necessary, ask us for your nearest source of supply. And write us for new free folder that tells the whole *Silent Duct* story. **Elgen Manufacturing Corporation, Dept. E-4, 41-34 39th St., Long Island City 4, New York.**

PAT. PEND.
UNION MADE

A. F. of L.

ELGEN
SILENT DUCT
SAVES ASSEMBLING CONNECTION MATERIALS

For combustion testing in the field!

HAYS ORSAT TYPE GAS ANALYZER

The first of its type developed for field work, the Hays Analyzer answers the need for an Orsat type gas analyzer husky enough for use in the boiler room and for installation and service work in commercial and home heating plants, yet simple, fast and accurate!

It's Rugged—Made with strong pressed steel, the Hays Orsat is designed for continuous boiler room operation and field work . . . takes wear and tear in stride!

It's Portable—The Hays Orsat contains everything needed for *complete* analysis (CO_2, O_2, CO) in one light (only 8 lbs.), easy-to-carry case . . . goes wherever it's needed. Compact, with all parts easily accessible.

Available in one, two or three unit styles. Does a complete testing job for CO_2, O_2 and CO in 3 minutes!

Send for publication 54-668-27—a complete description of all styles.

Automatic Combustion Control Boiler Panels • CO_2 Recorders Veriflow Meters and Veritrol Gas Analyzers • Draft Gages Combustion Test Sets Electronic Oxygen Recorders Electronic Flowmeters Electronic Feed Water Controls Miniature Remote Indicators

THE hays CORPORATION

MICHIGAN CITY 28, INDIANA

MATCH THE MIRACLE OF MODERN BUILDING

WITH THE NEW LO-SIL POWER ROOF VENTILATORS

Here's functional beauty combined with maximum operating efficiency. The new LO-SIL has been especially designed for schools, hospitals, libraries, churches, restaurants, and commercial buildings. Muckle—the most dependable name in power ventilation meets the new trend in architecture with the low silhouette, high efficiency LO-SIL VENT.

Totally enclosed motor mounted on vibration separators. Easy to install—heavy gauge steel, electric welded, 31 sizes—250 CFM to 17600 CFM.

Write today for Free Application information.

Muckle MANUFACTURING COMPANY

OWATONNA 3, MINN.

Do it with a

DOERR MOTOR

When we say that Doerr Motors are made for tough industrial applications, we can back it up 100%. The entire range of machine tools—from power tools up to boring mills—utilize Doerr Motors for a large variety of main and auxiliary drives. Many thousands of small electric hoists, hydraulic pumps, unit heaters, exhaust fans, rotary oil burners and adjustable speed drives receive dependable power from Doerr.

If you want more information, write for Bulletin 100, which shows many of the special and standard designs available.

Electric Motors from 1/30 to 5 hp. Standard, or designed to your specification.

DOERR Electric Corporation

STEARNS WISCONSIN

LOW INSTALLATION

AND MAINTENANCE COSTS

. . . plus added years

of dependable service

★

TODD BURNERS

GAS OR OIL

★

COMBUSTION EQUIPMENT DIVISION

TODD SHIPYARDS CORPORATION

81-16 45TH AVENUE

Elmhurst, Queens, N. Y.

TODD NEW YORK, U.S.A.

Best for Clients

PROVED RELIABLE, ECONOMICAL

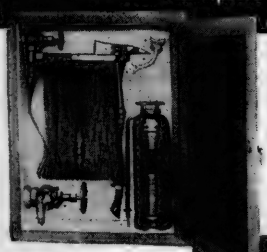
ALLENCO

INTERIOR

FIRE-PROTECTION EQUIPMENT

Complete Line—480 Cabinets Alone

Modern, Most Widely Used



Easiest for you

Reliable Delivery—

Goes in Easier

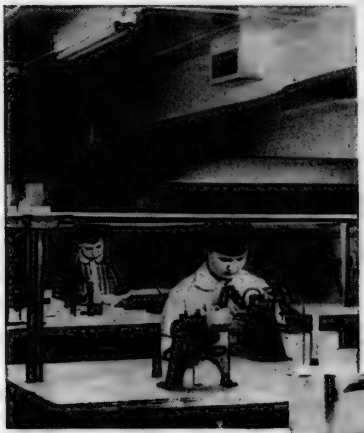
SINCE 1887

W. D. ALLEN

Manufacturing Co.

CHICAGO 6 • NEW YORK 7

You can have DRY AIR with exact moisture control..



Assembling Electronic Parts

FOR YOUR COMFORT

FOR YOUR PROCESS

FOR TESTING MACHINES OR MATERIALS AT ANY TIME OF THE YEAR

Packaging Food Products

Drying Industrial Material

● This Niagara "Controlled Humidity" method gives you the **MOST EFFECTIVE** Air Conditioning because its cooling and heating functions are made completely separate from adding or taking away moisture. This assures you always a precise result. No moisture sensitive instruments are needed.

MOST FLEXIBLE. You can reach and hold any condition in response to instrument settings, or vary it as you wish.

EASIEST TO TAKE CARE OF. The machine is accessible, the control circuits are simple and easy to operate, and there are no solids, salts or solutions to be handled.

MOST COMPACT. It does a very large amount of work in a small space.

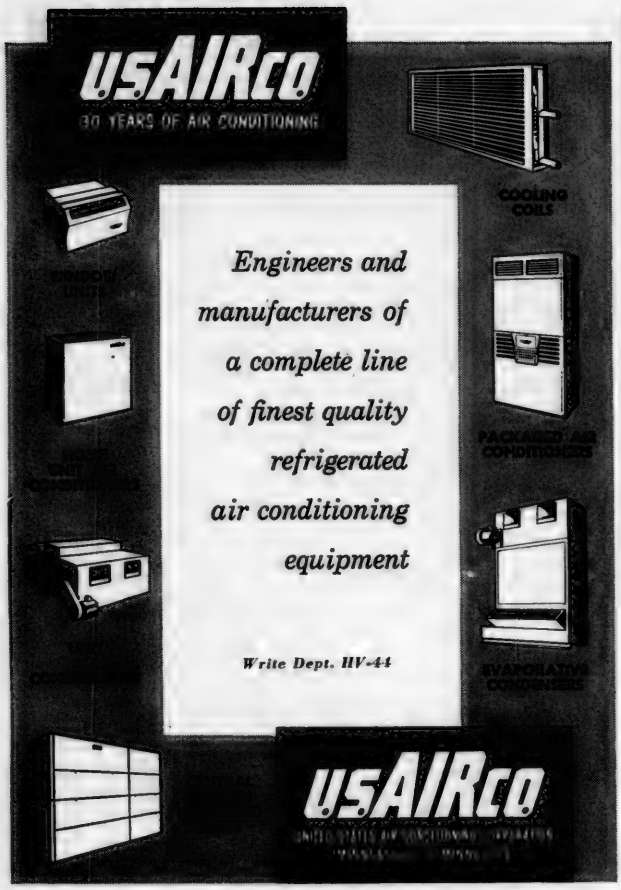
INEXPENSIVE TO OPERATE. At normal atmospheric temperatures (unlike systems that use refrigeration to dehumidify) it needs no summer re-heat.

Write for Bulletins 112 and 122

NIAGARA BLOWER COMPANY

Dept. HV, 405 Lexington Ave. New York 17, N. Y.

Niagara District Engineers in Principal Cities of U. S. and Canada



HEAT when and where you need it — at the flip of a switch.
SAVE on low initial cost, simple installation and efficient operation.
ENJOY fully automatic controls and years of dependable performance.
OLSON
DIRECT FIRED HEATERS
Gas, Oil, Coal or Dual Gas and Oil
Arthur A. Olson & Company
Canfield, Ohio
Write for bulletin and engineering data sheet

CLASSIFIED ADVERTISING

Non-display advertisements 15 cents a word per insertion. (No charge for name and address.) Minimum charge $3.00. Payable in advance.

ASSISTANT TO MANAGER

National manufacturer of air conditioning, heating, ventilating and heat transfer equipment has excellent opening for graduate engineer, 30 to 35 years of age. Man selected will serve as assistant to manager of expanding unit air conditioner sales department. Unusual opportunity to advance with growing concern. Submit resume to: The Trane Company, La Crosse, Wisconsin; Att.: D. B. Reed.

Manufacturer's Representatives

Territories now open for America's top line of advanced design copper tube boilers, packaged for radiant heating, baseboard, air conditioning, pools and hot water supply.

Raypak Company, Inc.
2416 CHICO AVENUE EL MONTE, CALIF.

What do you know . . .
What do you want to know . . .
about Fuel Oil?
Write for description of
FUEL OIL MANUAL
by Paul F. Schmidt
THE INDUSTRIAL PRESS
148 Lafayette St., New York 13

TOP-FLIGHT SALES ENGINEER and Organizer Refrigeration & Air Conditioning, by previous experience & command of languages best qualified for Export Department, desires to contact leading Manufacturer. Box No. 821, HEATING AND VENTILATING, 148 Lafayette St.. New York 13, N. Y.

RADIANT HEATING
by T. Napier Adlam
Write for free circular on this authoritative book to
THE INDUSTRIAL PRESS
148 Lafayette St., New York 13

SALESMAN
PLUMBING SPECIALTIES

To sell Plumbing and Heating Specialties and Supplies for established New York firm exclusive territory. Commission. Replies confidential. AKRON SUPPLY CO., INC., 216 Grand Street, Brooklyn, N. Y.

Is there any equipment you need, or would like to sell? Or a position you have open, or want to secure? The Advertisements in HEATING AND VENTILATING'S Classified Advertising Section bring results! Rates are 15 cents a word (minimum charge $3.00); or $8.00 for a single column inch. Please send payment with your order.
Classified Advertising Dept.
Heating and Ventilating
148 Lafayette Street
New York 13 New York

MECHANICAL ENGINEER

for general building contractor. Excellent opportunity and permanent position with young, expanding company. Must be capable of estimating and analyzing subbids received from mechanical and electrical subcontractors and supervise and expedite work after subcontract awarded. Write full particulars, including education, experience, personal details, and salary requirements to:
BLOUNT BROTHERS CONSTRUCTION CO.
Post Office Box 1144, Montgomery, Alabama

An Authoritative Reference Book
for
- Heating Engineers
- Estimators
- Air Conditioning Engineers
- Ventilating Engineers
- Architects
- Piping Engineers
- Contractors
- Plant Engineers
- Operating and Maintenance Engineers

HEATING AND VENTILATING'S
ENGINEERING DATABOOK
Write for Descriptive Folder

ALPHABETICAL INDEX OF ADVERTISERS

A

Acme Industries, Inc. 62
Aerofin Corp. ..... *
Air Devices, Inc. 156-157
Air Filter Corp. ..... *
Air-Maze Corp. ..... *
Airtemp Div. of Chrysler Corp. 61
Airtherm Manufacturing Co. ..... *
Alco Valve Co. ..... *
Allen-Bradley Co. 36
Allen, W. D., Manufacturing Co. 161
Allis-Chalmers Mfg. Co. 25
American Air Filter Co., Inc. 18-19-68
American Blower Co. 20
American Brass Co. 53
American District Steam Co., Inc. 37
American Gilsonite Co. 9
American Machine & Metals, Inc. 1
American Radiator & Standard Sanitary Corp. 40
American Society of Heating & Ventilating Engineers ..... *
Ames Iron Works 158
Anemostat Corp. of America ..... *
Armstrong Machine Works ..... Inside Front Cover
Atlas Mineral Products Co. ..... *

B

Babcock & Wilcox Co. ..... *
Babcock & Wilcox Co., Tubular Products Div. 71
Baltimore Aircoil Co., Inc. ..... *
Barber-Colman Co. 44
Barkow, Aug., Mfg. Co., Inc. 30
Barry Corp. ..... *
Bell & Gossett Co. 51
Bethlehem Steel Co. ..... *
Binks Manufacturing Co. 135
Bishop & Babcock Mfg. Co. ..... *
Bituminous Coal Institute 131
Boiler Engineering & Supply Co., Inc., Continental Boiler Div. ..... *
Brunner Manufacturing Co. 7
Bryant Heater Div., Affiliated Gas Equipment, Inc. 64
Buffalo Forge Co. 15
Bundy Tubing Co. ..... *
Burnham Corp. 21
Burt Manufacturing Co. 140
Bush Manufacturing Co. 141
Byers, A. M., Co. ..... *

C

Carnes, W. R., Co. ..... *
Carrier Corp. 149
Chase Brass & Copper Co. 49
Chemical Solvent Co. 147
Clarage Fan Co. ..... Inside Back Cover
Classified Advertisements 162
Cleaver-Brooks Co., Boiler Div. 63
Cleveland Fuel Co. 27
Combustion Engineering, Inc. 42
Committee on Steel Pipe Research ..... *
Connor Engineering Corp. 47
Cook, Loren, Co. 159
Copeland Refrigeration Corp. 57
Cox Manufacturing Co. 139
Crane Co. 56
Curtis Refrigerating Machine Div., Curtis Manufacturing Co. 10

D

Davis Engineering Corp. 142
Debothezat Fans Div., American Machine & Metals, Inc. 1
Decatur Pump Co. ..... *
Delta Heating Corp. 159
Detroit Controls Corp. 137
Doerr Electric Corp. 160
Dollinger Corp. ..... *
Dunham, C. A., Co. 73
Duriron Company, Inc. 150
Duro-Dyne Corp. ..... *
Dwyer, F. W. Mfg. Co. 155

E

Electro Dynamic Div., General Dynamics Corp. 39
Elgen Manufacturing Corp. 159
Elgo Shutter & Mfg. Co. ..... *
Ellison Draft Gage Co. 153
Emerson Electric Mfg. Co. ..... *

F

Farr Company ..... *
Field Control Div., H. D. Conkey & Co. 148
Fitzgibbons Boiler Co., Inc. 132
Flexaust Co. ..... *
Flexonics Corp. ..... *
Frick Company 52

G

Gallaher Co. 143
General Blower Co. ..... *
General Electric Co. 26
Glass Fibers, Inc. 58
Governair Corp. ..... *
Grinnell Co., Inc. ..... *
Gustin-Bacon Mfg. Co. ..... *

H

Halstead & Mitchell 43
Hays Corp. 160
Henry Valve Co. ..... *
Hoffman Specialty Mfg. Co. 79

I

Illinois Engineering Co. 69
Illinois Testing Laboratories, Inc. ..... *
Industrial Press 72-144-145
Infra Insulation, Inc. 5
Iron Fireman Mfg. Co. ..... *

J

Jenkins Bros. ..... *
Johnson Service Co. ..... Back Cover
Joy Manufacturing Co. 41

K

Kaiser, E. B., Co. ..... *
Kennard Corp. ..... *
Korfund Co., Inc. 151
Kramer Trenton Co. 154

L

Ladish Co. ..... *
Lancaster Pump & Mfg. Co., Inc. ..... *
Lawler Automatic Controls, Inc. 143
Libbey-Owens-Ford Glass Co. ..... *
Liquidepth Indicators, Inc. 149

M

Magnetrol, Inc. ..... *
Marley Company 29
Marlo Coil Co. 78
Marsh Heating Equipment Co. 46
McCord Corp. 152
McDonnell & Miller, Inc. 31
McQuay, Inc. 75
Minneapolis-Honeywell Regulator Co. 128-129
Modine Manufacturing Co. ..... *
Muckle Manufacturing Co. 160

N

Nash Engineering Co. 82
National Heater Co., Inc. 155
National Tube Div., United States Steel Corp. 24
Naylor Pipe Co. ..... *
Nelson, Herman Div., American Air Filter Co., Inc. ..... *
Niagara Blower Co. 161
Nicholson, W. H., & Co. ..... *

O

Oil-Heat Institute of America, Inc. 60
Olson, Arthur A. & Co. 162
Orr & Sembower, Inc. 22-23

P

Palmer Thermometers, Inc. 147
Patterson-Kelley Co., Inc. 133
Petro 38
Powder Power Tool Corp. ..... *
Powers Regulator Co. 16-17
Production Planning Co. 153
Pyle-National Co. 48

R

Ramset Fasteners, Inc. 151
Reading Tube Corp. 11
Redmond Co., Inc. ..... *
Rempe Company 155
Revere Copper & Brass, Inc. 125
Richmond Engineering Co. ..... *
Ric-Wil Co. ..... *
Rigidbilt, Inc. ..... *

S

Sarco Co., Inc. 59
Sarcotherm Controls, Inc. 76
SelecTemp Div., Iron Fireman Mfg. Co. ..... *
Siemon Manufacturing Co. 153
Skidmore Corporation 74
Smith, H. B., Co., Inc. 67
Spence Engineering Co., Inc. ..... *
Sporlan Valve Co. ..... *
Sturtevant Div., Westinghouse Electric Corp. 54
Superior Combustion Industries, Inc. 35

T

Taco Heaters, Inc. 146
Taylor Forge & Pipe Works ..... *
Thrush, H. A. & Co. 77
Titusville Iron Works 45
Todd Shipyards Corp., Combustion Equipment Div. 161
Trane Co. 12-13
Tube-Turns, Inc. ..... Insert 33-34
Tuttle & Bailey, Inc. ..... *
Typhoon Air Conditioning Co., Inc. 50

U

United States Air Conditioning Corp. 162
United States Steel Corp. 24
Universal Diffuser Corp. ..... *

W

Wagner Electric Corp. 28
Want Advertisements 162
Watts Regulator Co. 164
Webster, Warren & Co. 2
Weil Pump Co. 139
Western Engineering & Mfg. Co. ..... *
Westinghouse Electric Corp. 54
Wiegand, Edwin L., Co. ..... *
Wing, L. J., Mfg. Co. 32
Worthington Corp. 66

Y

Yarnall-Waring Co. ..... *
York Corp. 14
Young Radiator Co. 55
Youngstown Sheet & Tube Co. 80

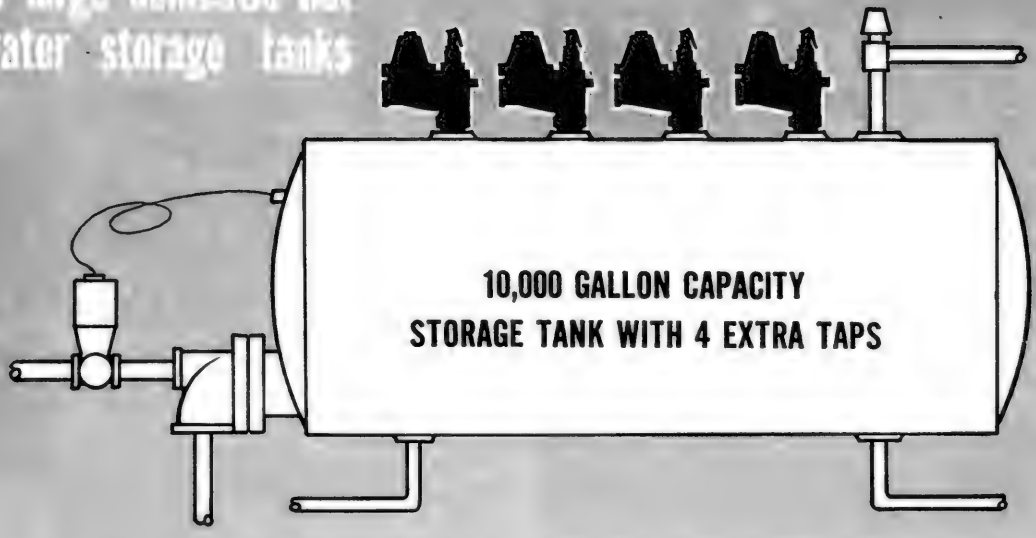
Z

Zonolite Co. 65
Zurn, J. A., Mfg. Co. 81

*Advertisement appeared in preceding issue.

BIG INSTALLATIONS

of large domestic hot water storage tanks



NEED TEMPERATURE PROTECTION BY. . .

WATTS No. 340

In this typical large installation, 10,000 gals. of domestic hot water are controlled by four of Watts No. 340 pilot operated T & P relief valves to prevent excessive pressure conditions—and more important—dangerous excessive temperature conditions. A combined total of more than 12,000,000 Btu/Hr. discharge capacity (ample for this job) is provided. No. 340 design includes Watts powerful new thermostat in the pilot valve which serves to actuate the large capacity diaphragm relief valve. Tested capacity of No. 340 is 3,000,000 Btu/Hr—inlet size 1½" N.P.T. Only relief valve of its type available.

RHODE ISLAND PLAZA APARTMENTS
WASHINGTON, D.C.

MILLS, PETTICORD AND MILLS, JR., ARCHITECTS AND ENGINEERS

WATTS REGULATOR COMPANY LAWRENCE, MASSACHUSETTS

Automatic

• TEMPERATURE *and* PRESSURE REGULATING SAFETY DEVICES •

SOLAR ENERGY RECEIVED ON A HORIZONTAL SURFACE

The accompanying data, prepared by I. F. Hand of the U. S. Weather Bureau, Blue Hill Observatory, Milton, Mass., show the amount of energy received by a horizontal surface in various locations in the U. S. and two stations in Canada. The figures are in Btu per square foot per average day for the various months as indicated.

Table 1 shows the relationship between daily average receipt of solar energy and (1) number of hours of sunshine per year; (2) average cloudiness; (3) yearly number of clear days, and; (4) percentage of daylight hours the sun shines. Table 2 covers the period October through March, inclusive.

Table 4 lists normals of the daily receipt of solar energy by months for the year, in terms of Btu per square foot per day.

Table 1. — Sunshine Data for Whole Year

Solar Energy, Btu per Sq Ft. per Day	Hours of Sunshine	Average Cloudiness: Scale, 1–10	Clear Days, 0–3 Cloudiness	Percent. of Daylight Hours Sun Shines
Under 1000	2177	6.6	86	48
1001–1200	2339	6.2	93	51
1201–1400	2643	5.5	123	58
1401–1600	2826	5.1	134	63
1601–1800	3055	4.6	166	68
1801–2000	3145	4.4	179	71
Over 2000	3776	2.6	246	84

Table 2. — Sunshine Data for Winter Months

(October through March, incl.)

Solar Energy, Btu per Sq Ft. per Day	Hours of Sunshine	Average Cloudiness: Scale, 1–10	Clear Days, 0–3 Cloudiness	Percent. of Daylight Hours Sun Shines
201–400	82	7.6	4.1	29
401–600	118	6.8	6.6	41
601–800	150	5.8	9.3	49
801–1000	171	5.3	11.1	55
1001–1200	197	5.1	11.7	59
1201–1400	211	4.8	12.1	64
1401–1600	242	4.7	13.3	68
1601–1800	245	4.4	14.4	72
1801–2000	271	4.2	16.0	73

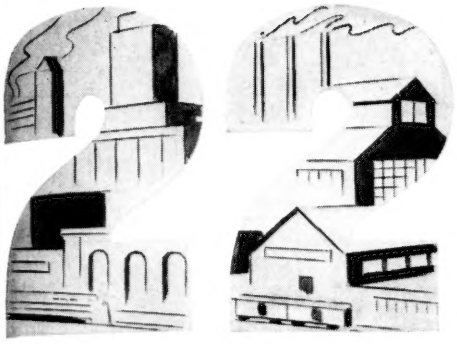
Table 3. — Receipt of Solar Energy As It Varies with Latitude

City	North Latitude	Yearly Aver., Btu per Sq Ft per Day	City	North Latitude	Yearly Aver., Btu per Sq Ft per Day
Miami, Fla.	25° 49	1497	Salt Lake City, Utah	40° 46′	1442
Brownsville, Tex.	25 55	1840	New York, N. Y.	40 46	1054
Gainesville, Tex.	29 39	1471	Sayville, N. Y.	40 46	1291
Apalachicolas, Fla.	29 45	1675	State College, Pa.	40 48	1154
New Orleans, La.	30 02	1250	Lincoln, Neb.	40 52	1354
Lake Charles, La.	30 13	1568	Upton, N. Y.	40 52	1269
El Paso, Tex.	31 48	2037	Cleveland, Ohio	41 24	1312
Fort Worth, Tex.	32 49	1699	Newport, R. I.	41 30	1258
La Jolla, Calif.	32 52	1526	Put-in-Bay, Ohio	41 39	1242
Charleston, S. C.	32 54	1575	East Wareham, Mass.	41 46	1204
Griffin, Ga.	33 14	1578	Blue Hill, Mass.	42 13	1243
Riverside, Calif.	33 32	1558	Boston, Mass.	42 21	1110
Santa Maria, Calif.	34 56	1817	Medford, Ore.	42 22	1575
Albuquerque, N. M.	35 03	1892	Ithaca, N. Y.	42 27	1119
Hatteras, N. C.	35 15	1594	Twin Falls, Ida.	42 33	1438
Oak Ridge, Tenn.	35 55	1307	East Lansing, Mich.	42 42	998
Las Vegas, Nev.	36 05	1822	Madison, Wis.	43 05	1218
Nashville, Tenn.	36 07	1253	Toronto, Ont., Can.	43 40	1078
Stillwater, Okla.	36 08	1467	St. Cloud, Minn.	45 35	1352
Fresno, Calif.	36 46	1670	Caribou, Me.	46 52	1227
Davis, Calif.	38 32	1633	Spokane, Wash.	47 37	1374
Washington, D. C.	38 56	1234	Seattle, Wash.	47 39	1160
Columbia, Mo.	38 57	1388	Glasgow, Mont.	48 11	1455
Seabrook, N. J.	39 30	1316	Winnipeg, Man., Can.	49 53	1216
Grand Lake, Col.	40 15	1573			

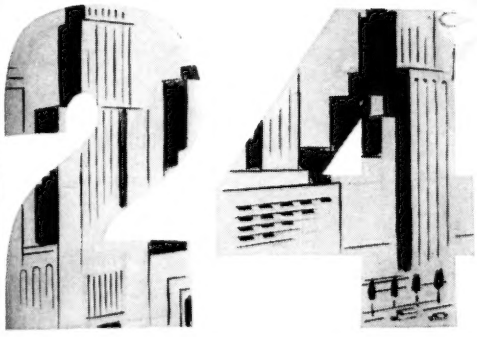
Table 4. — Daily Averages, Btu Per Sq. Ft., of Solar Energy Received on a Horizontal Surface, By Months

(Yearly averages are given in Table 3)

City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Miami, Fla.	1100	1284	1535	1756	1852	1771	1749	1716	1528	1351	1232	1085
Brownsville, Tex.	1240	1465	1782	1919	2144	2590	2472	2336	1934	1786	1221	1192
Gainesville, Fla.	1011	1255	1587	1937	2066	1904	1823	1624	1446	1181	974	841
Apalachicola, Fla.	1192	1542	1616	1941	2074	2192	2103	2007	1646	1513	1317	959
New Orleans, La.	756	915	1207	1487	1590	1697	1491	1439	1402	1258	952	804
Lake Charles, La.	1041	1114	1531	1771	2118	2151	1926	2052	1594	1439	1262	819
El Paso, Tex.	1328	1546	2125	2524	2716	2731	2531	2435	2103	1786	1428	1207
Fort Worth, Tex.	1015	1218	1734	1875	2140	2332	2303	2258	1779	1587	1277	867
La Jolla, Calif.	930	1181	1550	1882	2007	2066	2015	1830	1572	1273	1107	904
Charleston, S. C.	923	1232	1664	2059	2288	2166	1989	1945	1509	1203	1137	786
Griffin, Ga.	1063	1107	1181	2103	2288	2273	2170	2066	1546	1358	1044	738
Riverside, Calif.	974	1151	1506	1823	2007	2207	2184	2011	1712	1321	1018	782
Santa Maria, Calif.	1070	1380	1882	2251	2506	2399	2428	2369	1945	1594	1114	867
Albuquerque, N. M.	1133	1354	1834	2236	2494	2749	2502	2299	2018	1712	1284	1085
Hatteras, N. C.	941	1063	1550	2103	2229	2266	2229	2125	1587	1269	1015	756
Oak Ridge, Tenn.	642	852	1055	1483	2103	2000	1838	1708	1517	1129	753	598
Las Vegas, Nev.	963	1292	1956	2111	2362	2771	2539	2332	2044	1483	1166	845
Nashville, Tenn.	524	753	1089	1557	1838	1934	1867	1668	1439	1125	779	465
Stillwater, Okla.	923	1004	1520	1801	1838	2196	1889	1937	1565	1255	900	775
Fresno, Calif.	664	1037	1539	2096	2406	2642	2576	2288	1889	1380	915	605
Davis, Calif.	738	1026	1417	1982	2387	2642	2605	2303	1834	1336	745	576
Washington, D. C.	568	738	1225	1513	1716	1867	1808	1631	1373	1085	745	539
Columbia, Mo.	598	930	1229	1631	1801	2077	2221	1856	1624	1299	731	664
Seabrook, N. J.	686	908	1321	1668	1897	2007	1838	1771	1336	1052	771	535
Grand Lake, Colo.	790	1144	1624	2030	2177	2362	2236	1989	1720	1328	863	613
Salt Lake City, Utah	572	908	1424	1882	2015	2192	2303	2247	1631	1026	661	443
New York, N. Y.	450	705	956	1339	1572	1646	1620	1351	1166	897	546	395
Sayville, N. Y.	635	904	1236	1631	1970	2066	1812	1694	1292	1070	686	498
State College, Pa.	506	642	1015	1428	1572	1845	1889	1683	1321	915	605	424
Lincoln, Neb.	686	930	1247	1576	1852	2052	2122	1775	1509	1114	771	613
Upton, N. Y.	568	790	1181	1550	2030	2081	1779	1683	1328	1111	642	487
Cleveland, Ohio	373	675	1030	1550	2140	2214	2192	1934	1705	1041	487	406
Newport, R. I.	583	845	1196	1535	1786	1963	1860	1683	1358	1092	668	524
Put-in-Bay, Ohio	509	756	1137	1476	1734	2092	2000	1830	1387	1026	557	399
East Wareham, Mass.	557	790	1085	1498	1720	1897	1768	1668	1299	996	627	542
Blue Hill, Mass.	601	923	1196	1465	1756	1911	1838	1708	1343	1077	601	498
Boston, Mass.	454	745	1085	1328	1661	1823	1690	1502	1184	937	502	406
Medford, Ore.	391	768	1232	2107	2790	2590	2804	2494	1753	1063	550	362
Ithaca, N. Y.	435	760	926	1173	1624	1867	1845	1697	1299	940	476	391
Twin Falls, Idaho	613	827	1269	1705	2184	2303	2280	1985	1646	1255	738	450
E. Lansing, Mich.	384	649	945	1284	1395	1638	1653	1432	1048	819	380	343
Madison, Wis.	539	797	1166	1498	1727	1904	1993	1690	1321	959	557	443
Toronto, Ont.	351	605	1004	1317	1668	1926	1756	1627	1144	797	399	347
St. Cloud, Minn.	627	878	1461	1734	2070	2066	2118	1667	1343	1048	646	561
Caribou, Me.	531	745	1192	1697	1771	1963	2015	1690	1343	937	450	391
Spokane, Wash.	443	731	1240	2111	1782	2269	2487	2144	1587	923	491	280
Seattle, Wash.	229	328	1033	1823	1867	2280	2170	1753	1255	627	325	229
Glasgow, Mont.	576	900	1446	1852	2362	2494	2435	2011	1395	900	642	450
Winnipeg, Man.	524	745	1225	1461	1945	2048	2052	1808	1166	841	417	365



2 OF THE



2 ARE USERS OF

CLARAGE

AIR HANDLING EQUIPMENT

Manufacturing companies reporting assets of more than ONE BILLION DOLLARS are users of Clarage air handling equipment.

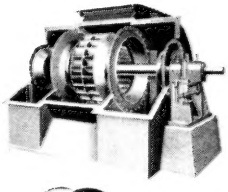
Wherever you are, you're close to a Clarage application engineering office . . . close to expert assistance that means satisfactory results accomplished MORE economically.

In every state and in many foreign countries as well, those who specify and those who use **like** our equipment. Clarage specializes — we build air handling and conditioning equipment exclusively.

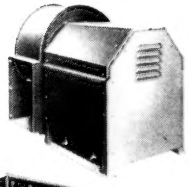
You can have faith that a Clarage unit is figured RIGHT for the required performance . . . built RIGHT to operate year after year with minimum attention.

Try us. You'll be in good company, as you can see!

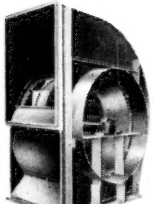
CLARAGE FAN COMPANY, Kalamazoo, Mich.



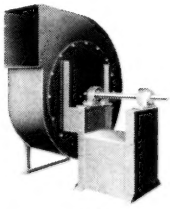
Equipment for forced and induced draft service



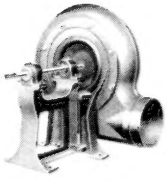
Ready-to-run units for light-duty ventilating



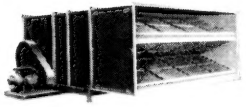
Fans for ventilation and air conditioning



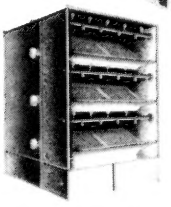
Fans and blowers for industrial services



Cast iron fans for special industrial applications



Multitherms — complete "package" air conditioning units



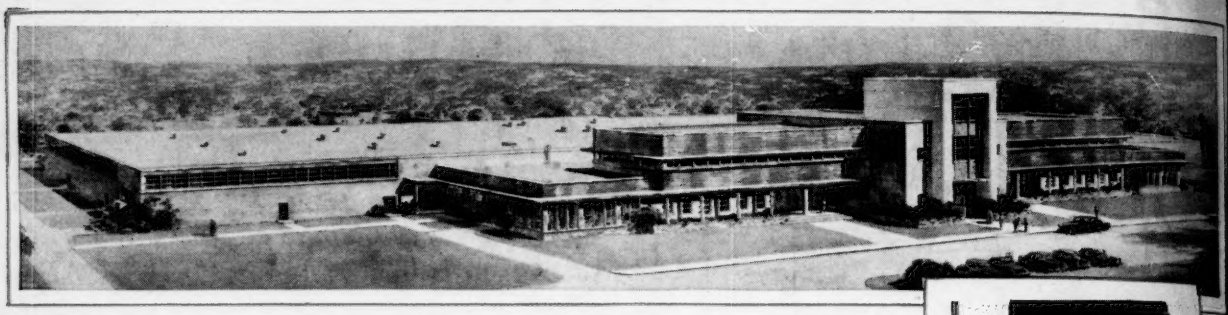
Air Washers for air cleaning and purification

You can Rely on...

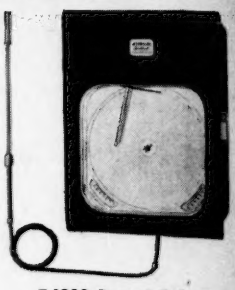
CLARAGE

Headquarters for Air Handling and Conditioning Equipment

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal



Another nationally-known Pharmaceutical Manufacturer chooses JOHNSON CONTROL

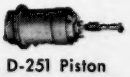


T-1000 Record-O-Stat

T-315 Submaster Room Thermostat

T-800 Capillary Thermostat

T-901 Submaster Thermostat



D-251 Piston Damper Operator

V-103 Coil Valve

White Laboratories, Inc., Kenilworth, New Jersey. A. M. Kinney, Inc., architects and mechanical engineers, Cincinnati, Ohio; Frank Briscoe Co., Inc., general contractor, Newark, New Jersey; Frank A. McBride Co., heating, ventilating and air conditioning contractor, Paterson, New Jersey.

In the modern new plant of White Laboratories, Inc., diversified control problems are automatically solved with precision by a comprehensive system of Johnson Control. A "Planned-for-the-Purpose" Johnson System automatically regulates temperatures to meet the requirements for processing pharmaceuticals and to insure worker comfort.

In the office section, Johnson Submaster Room Thermostats, reset in accordance with outdoor temperatures, regulate Johnson Double Mixing Dampers to maintain exactly the desired conditions. Throughout the Main Building and in the Chemical Building, Johnson Thermostats control Johnson Valves and Damper Operators on central fan heating and ventilating units.

Much of the processing and many of the manufacturing areas are controlled by Johnson Series T-1000 "Record-O-Stats", temperature controllers which also provide a continuous record of temperatures for future reference. This is important where processes and product quality are dependent upon precise temperatures . . . another outstanding example of the adaptability of Johnson Control.

Whether the solution of your control problem requires the application of a single controller or the installation of an intricate temperature and humidity control *system*, let a Johnson engineer help you. Get the benefit of 65 years of experience by the *only* nationwide organization devoted exclusively to manufacturing, planning and installing automatic temperature and air conditioning control systems. JOHNSON SERVICE COMPANY, Milwaukee 2, Wisconsin. Direct Branch Offices in Principal Cities.

JOHNSON *Automatic Temperature and Air Conditioning* **CONTRO**

MANUFACTURING • PLANNING • INSTALLING • SINCE 1885